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# Thomas A Edison Papers

## A SELECTIVE MICROFILM EDITION PART V (1911-1919)

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Thomas A. Edison Papers  
at  
Rutgers, The State University of New Jersey  
endorsed by  
National Historical Publications and Records Commission  
18 June 1981

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The original documents in this edition are from the archives at the Edison National Historic Site at West Orange, New Jersey.

ISBN 978-0-88692-887-2

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## FINANCIAL CONTRIBUTORS

We thankfully acknowledge the vision and support of Rutgers University and the Thomas A. Edison Papers Board of Sponsors.

This edition was made possible by grant funds provided from the New Jersey Historical Commission, National Historical Publications and Records Commission, and The National Endowment for the Humanities. Major underwriting has been provided by the Barkley Fund, through the National Trust for the Humanities, and by The Charles Edison Foundation.

We are grateful for the generous support of the IEEE Foundation, the Hyde & Watson Foundation, the Martinson Family Foundation, and the GE Foundation. We acknowledge gifts from many other individuals, as well as an anonymous donor; the Association of Edison Illuminating Companies; and the Edison Electric Institute. For the assistance of all these organizations and individuals, as well as for the indispensable aid of archivists, librarians, scholars, and collectors, the editors are most grateful.

**START**

**239**

**A Note on the Sources**  
The pages which have been  
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**NOTEBOOK SERIES  
NOTEBOOKS BY EXPERIMENTERS  
OTHER THAN EDISON**

**Notebook Series -- Notebooks by Experimenters Other Than Edison  
Kinetophone and Kinetoscope Experiments -- A. M. Kennedy Books  
Notebook, N-14-01-12**

This notebook was used by Absalom M. Kennedy during January-August 1914 as a daily log of experimental work on the kinetophone. Included are descriptions of tests with recording horns and various recorders, as well as notes on film cement, synchronizers, shutters, and varied lighting. There are also entries regarding the arrangement of sets, building new scenery, and setting up a dark room. In addition, there are accounts of demonstrations for Charles and Mina Edison and other individuals, along with descriptions of meetings with other laboratory employees doing work on motion picture development. Several experiments in this book are described in more detail in N-14-01-01.3. Some entries are related to work documented in Notebooks by Edison and Other Experimenters—Recorder and Recording Experiments—A. M. Kennedy Books. The notes indicate that Kennedy received instructions, comments, and suggestions from Edison and that he was reporting to Miller Reese Hutchison. Harry W. Doyle, L. E. Hammond, Victor Hurter, D. McRae, Henry A. Taylor, and experimenters named Brodigan, Buchwald, Johnson, and Tuthill assisted Kennedy, while J. O. Lyman and George J. Werner were involved in similar recording work. The front cover is labeled "Daily Record of Work from Jan. 12, 1914. to Aug 5 - 1914." The pages are unnumbered. Approximately 100 pages have been used.

Jan 12, 1914.

Started J. McKee on Studio  
Outfits. Found parts & started  
him assembling Camera Drive.

Checked up films & reports received  
for Road Trip with Butler &  
checked his inspection.

Met Coyle & Nether & looked Road.  
Show sent them. Took them to  
see Mackenney & saw Maxmire &  
discussed new plans for Road Show.  
Maxmire included to taking Nature  
Notes now.

Saw Butler about motor  
starting device. No progress.

Saw Farrell & Mackenney on  
new film cement truck. OK. Want  
Engineering Notice on it.

Inspector interviewed Russian  
Film from Rehearsal.

Had Butler, Dingler & film  
run & passed with record & memo  
to Farrell as OK.

Ran show for Chas Edison at  
night. Deleted memo & letters.

1/13/4.

Arthur starts in on making  
Mr. E. german silver reels & shoes.

McKee starts in on getting  
synchronizer ready for outfit.

Victor starts having hard time  
with motor starter.

Law Kangley on Celestial  
Apparatus returned to Celestial Dept.  
Brought out 10 reel of stocking on  
clips to hold Kriitophone hand telephone  
in Booth. Kangley will attend to this.

② Nestinghouse good design of induction  
motor starter. ③ had of other than  
cast iron grids for rheostats.

Worked on solvent cement for  
film. Mixture of 50% alcohol. 50%  
acetone tried. Not always reliable.  
Did not make good joints unless  
used in excess.

Arthur starts on Mr. E's reel  
& shoe. Make german silver reel  
and chemically etched same.  
Looked after inspection of film

Jan 14-1914.

Had Peter finish up inspection  
of films and deliver to Shipping  
Dept.

Inspector Victor Hantz model  
motor starter. Sum. Too complicated.

Ran show for Presbyterian Board  
Publication - Philadelphia, Pa.

Interviewed Knipper who turned  
up from Road Show.

Went to New York with Tuttle to  
inspect installation at 10-5th Ave  
for show next morning.

Get report from Tuttle on needs  
for show Saturday Night next in  
Larson Club at Washington Hotel.

Discussed regarding experiments with  
Taylor.

Jan 15-1914.

Tested out Mr. E's gunner oiler  
pail and shoe. This has slight  
friction. Quality good. Volume  
not so loud as Reblers. ~~Instructions~~  
Tut to grind shoe & race to fit  
and to restitch both deeper.

Made up sample of film cement  
to match "Bueboy" manufactured  
by the "One Drop Oil Co. Chicago Ill.  
This consists of:

3gal Denatured Alcohol	45	90
2" Acetone	.80	1.60
2" Benzole	.30	.60

5/310  
624 gal.

It applied as "Bueboy" cement,  
that is thick - generally to best  
purpose to be cemented, it makes  
an excellent joint. Try cutting  
down or out the acetone.

Saw Mr. Uguw, Operator why  
wants to become installer. Nothing  
learned from him.

Had Victor Hunter make up sample steel tape to align sprockets as per memo from Mr. Farrell. Finished up O.K.

Talked Mr. Durand with Langley & Tanahan about Mr. Kubie's suggested method of starting. G. C. Inpton on chainy machine. Legal Department does not want to give opinion until commercial model is made.

Checked up media on Studio Outfit. Camera received and mounting same started.

No films received for inspection Sent Roumerain down to Sec's Dept.

Farrell requests Turtill & D. to be at Committee meeting to night to run film if Rayford did not show up.

Made two parts for Emulsionizer on foreign letter.

Jan. 16, 1914.

Task Steel strips for lining up  
Kinetoscope shutters to R. Dept.  
Met. Hall. Repairs as not exact.

Received film & records from  
Block Room.

Sent Ritter to New York to  
buy show

Sent Victor Schuster to check  
up South Orange High School  
Jes. - must tell them, Carter & Quatro.  
Saw Chapin. Showed new  
Lynman <sup>making plans for him.</sup> Showed  
his and American Talking Pictures  
to Hermann.

Sent out to Mr. to check up  
machines there.

Mr. Kuhn undertook Motor Picture

July

Note to Mr. H. from Mr. Gibson  
about men for European Studio Jels.  
Tracked Kinetophone plans with  
McChesney.

Shuttered on Kinetoscope  
Shutters.



Jan. 26.

Doyle turned up from Studio and said Hingham sent him out. Saw H. who said let him go. Will see about letting Doyle go to me. Churney & pulling Doyle on Studio assembly as he knows more about it.

Put Johnson to #10-5th Ave after pulls records and to General Studio after Okalus outfit. Father makes changes on camera viz - tripod screw socket - pointer on lens & stop to come through the hood.

Jan. 27. - Put Doyle on Okalus Studio outfit getting this ready for shipment.

He needs also

1 A.C. Motor for phasing machine  
20 cells Edison Storage Battery  
Rubber pads for amplifier.

Checked out.

Put Johnson to General Studio for another record set.

1/27/14

Ran show for Mrs. Edison.

~~Inspected~~ ~~Gunnman~~ ~~show~~

1/28/14. Finished checking  
Oskies outfit. Chucks  
OK except rubber tubing  
not blown to nyle.

Checked out Werner's Austrian  
Outfit #2 and sent to packing  
Dept.

Ran pictures for Gunnman  
Representatives. They go to  
Studio with them to morrow.

1/29/14. Went to New York to show  
Messrs. Anschutz and Ludwig the  
Oscar Studio. Left 7:30. Arrived  
9:30. They arrived 10:45. Saw  
Hugham. Showed them a trial  
set up and made record of  
findings were very good.  
They complain Rouquer about  
treatment; that they want to  
see Mr. Nelson and Mr. Edison  
and talk over what they have  
to contend with. They complain  
also that the phonographs  
are not as loud there as here.

Got back about 4 Pm.  
Saw Hammond & showed him  
new pictures.  
Went to Committee meeting. Ran  
two talking pictures.

---

1/30/14. Took up looking after  
German Representatives which  
Muller.  
After show for Edison Club  
at Columbus Hall - Inspector  
Lay out.  
Took up Hammond's  
complaints of European Controphone  
material etc.

2/1/14. Went in N.Y. - Met Mrs. Mel  
Toles, Mrs. Miller Miss Sullivan  
and went to studio with them &  
show them around. Higham took  
rehearsal of "The Song of the South". Took  
recording of Mel Toles voice. Not very  
good. Enunciation clear but not  
enough power in it.  
Met Messrs. Arnold and Ludwig  
with the baby transducer and his

husband at Hoboken and came  
on to Orange with them. Found  
Committee Room occupied so fixed  
up Raf demonstration room to show  
them the German subjects. Afterwards  
went to Committee Room and ran  
over the whole lot. They decided  
on the prints.

Ill

2/17/14.

Tested out Edison Economy  
Transformer against Fort Wayne  
Compensare and found the former  
generally superior.

Started still strip to line sprockets  
with aperture plate on model  
D Kinetoscope

Work on Studio Outfits.

Started further on magnetic  
Reproducers.

2/18/14.

Returned Port Wayne Compensares.

Work on Studio Outfits.

Check up Magnetic Reproducer.

Taylor & Brodigan came in.  
Arranged to film lacking pictures  
for them.

Spent Hammond on Flasherless  
Shutters.

Instruction and Exhibition of  
Kinetophone Subjects to Taylor and  
Brodigan.

8/19/14.

Saw to having Taylor & Brodegan  
instructed on Synchronizing.

Tested Gundlach against B. L.  
lens for Kinetoscope.

Inspected films patched by  
Ritter.

Selected films for Committee  
Room.

Sent Hammond to see about  
Edison Club Show tonight

Drew new diagram for  
Potable Photostat.

Inspected new films of  
A Mutual Misunderstanding  
and out for Andrew Carnegie.

Committee night. Ran new  
films.

2/22/16

Testing out change on portable  
Phonograph for Road Shows.

Ran and filmed "10 days with the  
Atlantic fleet".

Digest of reports of Bronx Studios  
Voice tests by Mr. Edison and  
select best voices & report to  
H.

Prepare for show at 2:30 for  
McKeechey.

Send Hammond to #10-5th Ave.

Send Mac blank cans to Keeney  
to test.

Practice on magnetic reproduction

Next to Bronx Studios to see  
take of picture.



8/21/14.

Arranged for show in Committee  
Room

Ran "10 days with flax" for MacLennan

Ran new films "Zamburisti" and  
Hoffman's Erzählungen for Mac  
Lennan.

Checked up Clow on Gauge.

Checked up Doyle on Shibus Chigfit.

Stated Schmand on flum cement  
& heater.

Note up record of actors from Mr  
Edison talks.

2/24/13.

• Sent Hammond & Johnson with  
Ford Car with apparatus for Union  
League Club Show.

Finished up Combined D.C. and A.C.  
Photostat for Road Shows.

Finished up strip for aligning  
sprockets with aperture plate on  
Kinetoscope.

Ran Hoffman Organizers, Samson  
& Dalilah, Zamburata #13, Co to  
Jest. Kinetophon. Thesona in Comm.  
Ran by for Hayes, Burg etc.

Finished up bottles for cement and  
new film cements.

Ran domestic film for Humphreys.

---

8/25/41.

Hammond completed can seal.

Repairs in Rhinostat Film Cement  
and bottles to meet for further  
tests.

With ~~Hammonds~~<sup>Humphreys</sup> criticizing talking  
pictures.

Records for Humphreys up  
stairs.

Ran new German Knives  
stuff for McChesney.

Committee meeting on film  
inspection

2/26/4.

Tried out all new Oesjma  
subjects selected best for Committee  
and determined cuts.

Ran over Regal Studio prints  
with Humphrey.

Show Union League in MRS  
East Hammond and Regal off.

Wax machining ready for  
Committee meeting.

Attended Committee meeting

Phoned Regham to come over  
to Committee meeting.

2/27/4.

Pay Bronx Birds receipts for  
Humphrey.

Get Tuttle & Co. to check up  
material for Cleveland

Get Ritten to \$10.00 and  
allow to take out Union  
League installation.

Inspector & Bureau Lectures  
for Foreign shipment.

Furnished Humphrey information  
on directing records of usages,  
stage setting etc.

2/28/14.  
Got Hattie and Cole off for  
Cleveland.

Looked after inspection of  
films & records.

Ran pictures for Humphrey &  
helped him out.

North Century Bureau &  
saw Annie Harold and  
in front of Susanna  
and J. Poggioli. Fine - look  
down the house.

3/1/14.

Went to meet. Met Mr.  
Gruen and Miss Humphrey of  
Huntville.

Got Taylor to come to lab  
to make records of Miss H.  
Ran taking pictures for  
them.

Took reproduced records  
of Miss H.

2/6/14

Experimental Hearing. Fried  
3'6" against 8'6" horns. Found  
no difference.

Inspected films & Records.  
Found no time down on  
A film & B record.

Had amplifying, recording and  
reproducing machines worked  
on.

Ran German subjects for Gale.



Found Kretzofre:

that about 20' reproduction better  
with recording machine on the  
floor in place of at standard  
height. If the voice is apparently  
aimed at floor about half way  
to recorder, results are best.

That reproduction is better with  
less tendency to bleed is less is the  
person recording, balance on  
balls of feet in place of standing  
with heels on floor.

3/11/14.

Spent most of day experimental  
recording. Got reproducing  
machine in shape.

Tried aluminum lever arm  
in amplifier in place of  
steel. Got better quality.

Taylor tried putting dope  
on reproducing machine to  
get better. Got oil on  
amplifier reel & put out of  
commission.

3/2/1

#5 Recorder Tests

Mica .0046

2 Gasbits

Nax Sealing

Nax & Sapphram

.028 Sapphram

A Recorder

Mica .0035 x 1.000

2 gasbits

Nax to gasbits

Shells & Sapphram

Recorder Head Standard 1 1/2"

Tests if these show that #5 recorder holds down blasts very well but is weak

"A" recorder blasts easily, is good and loud. Reproduces blasts well.

Recorder #62 (Payton)

.0045 - 2 gasbits

Recorder #63 (Payton)

.0045 - 1 gasbit.

3/10/4.

Record #61 just test very full.  
Should be good with thin voice

Record #7 - .007-ohmms standard  
This record is very weak. Should  
not be used

Records #3-62-63 - tested with  
phonograph record of Hoffmann's  
Erzählungen. 3 appeared generally  
best. 62 good on high but rather  
on low notes - 63 more even but  
not so good as #3.

Records of Miss Dunwoodie

#1 - Records #5 -

#2 - " " #5 -

"All at 10"  
"Last Rose of Summer"  
even tone.

Miss Dunwoodie prefers #62  
Record  
ARK prefers #3 Record.

9/12/14 - Tuesday.

Test of #1

Amplified same motor regular and with aluminum arm, rubber to weight and direction of manual motion reversed.

Apparently the first named had more quality but less volume. The second had more volume but less quality.

Mr. Pierman preferred the latter or standard.

Test #2

Test of Records #1's 3-1-A.

#3 - Standard ex 0025' mic

#1 - " " .0046 "

A = 1" diameter "00275 "

A is most sensitive but shows a tendency

to bleed

#3 is gay open tone but has a back in horn

#1 seems to be the most satisfactory.

Test of Records #1's 3-1-MK

3-1 as before. #MK is good

Show at Plainfield.

3/4/16

Listen to tests of recorders.  
Found out about Dape.

Make up recording.

Tests with Mr. Humphries on  
master record.

Go to Beane Studios to run  
pictures for actors and  
take Kodak camera to  
Higham.

---

3/16/13. Monday.

Test out Shuttles for Gace.  
Look after inspection in  
Committee Room.

Look over Opus Libellus.  
Up and down Bay with  
Humphreys.

Get Shilage Ballou's Charge  
Amperin passed to have master  
on top and get rid of chips.

Test new rubber lined diaphragm  
of Taylor. Holds bleats fine  
but not sensitive enough.

Test recorders #3 & 4 of Doyle.  
#7 promising - sensible. #9  
Not.

Test #9. #1 & New Rubber Recorder make  
own.

#9 good

#1 Standard

# Rubber very promising. Seems  
to show tone but better than  
others.

Found metallic particles in record  
in this test hammer and traced  
it to recording horn.

---

3/17/14.  
Trials of new recorders.

Made up new recorder with  
aluminum window as suggested  
by Mr. Purman - Apparently much  
more sensitive than regular  
Pomany. Will carry on further.

Test of same recorder  
1st with rubber window  
2nd " " " " with ell.  
3. " " " " only  
4th " metal window

#2 apparently best but  
only slightly. The difference  
seems to be that while the  
rubber window adds slightly  
to the sensitiveness of the  
recorder its poles from the  
quality of the tones.

Further listening to results  
at night seems to show  
that the rubber reflector in  
window while apparently



making the recorder more  
sensative does so by adding  
a rattle or tone to the regular  
at the expense of quality of  
the regular recording ~~with the~~  
expense of getting out ~~an~~ ~~extra~~  
Taylor slightly ~~with~~ ~~the~~ ~~recorder~~  
might

Letters to Husselaar & Henzmann  
Listened to Records & cleaned up  
scatologues

Made piano records with  
various recorders.

3/18/14.

Continued to Doyle work on Amplifiers.

Saw Reinhold on photography etc of last batch of Acme Studio subjects.

Suggests Camera men come out here & see developing operation for final instruction in depth of developing & appearance of good negative. Suggests making standard prints for men to compare with.

Write Report to Mox on last lot of subjects.

Experiment with Humphries on how best to concentrate sound. Also his suggestion of pipe and curved reflectors to help concentrate sound.

Got for Foreign Department  
Lino and Aluminum Drive  
Mail for St. Petersburg Studio.

Night  
Test Recorders, Dayle Voice & Piano

#1.

#8.

#10.

#11

#7

#1's 8 and 11 apparently the best

Test Recorders, Dayle at  
8 ft - Kennedy at 2 ft

X #7 poor - sensitive of fuel  
#8 good  
#10 good but sharp - "  
X #11 fair  
#1 good - holds down -

Test Recorders - Dayle at  
8 & 10 ft - Mistle & Piano

#1 good in voice - fair piano  
#8 good - more sensitive than 1, not so good on whistle  
#3 good - throughout  
#10 good - whistling best

# Test Records

	Days	Speaking	Whistling	
	70	80	80	seconds
#10	70	80	80	seconds
#1	80	80	70	seconds
#5	75	85	90	seconds
#8	80	80	80	seconds

3/19/44.

Test of Aluminum arm on amplifier. Dayle Singus Root & piano

- 1 - Regular arm @ 96 P.P.M.
- 2 - Alumin. arm at @ 96 P.P.M.
- 3 - " " at 120 P.P.M.

Dayle and Kennedy agreed that the aluminum arm gave less volume but more natural tone. That 120 P.P.M. is a little louder than at 96 P.P.M. and is more pleasant. Pierman decided that #1 was the best of the three.

Another test of Same on Miss Humphreys song -

- 1 - Regular arm @ 96 P.P.M.
- 2 - Aluminum " @ 96 P.P.M.
- 3 - " " @ 120 P.P.M.

3 was best - 2 second - 1 third.  
I and Y much more natural than 1.  
They note agree with Pierman.  
I also agree that #3 is best in each case.

Doyle made up rubber tubes  
records with tubing furnished by  
Purman. Cassatt tests prove this to be  
an excellent record, sensitive yet  
does not bleed.

Night.

Committee Meeting. Pictures  
show up very well. More fleshy  
than usual.

Ran Tales of Hoffmann for Road  
show with Trickett.  
Tried out Rubber Diaphragm  
against #1 Record. Rubber  
apparently the better.  
Cleaned out old used blanks.

Reorder #11

Mesa 0055S (straight) - standard -


Reorder #12

Mesa 0028F (Consane) - Standard -

Reorder #7

Mesa 004F (straight) - Standard -

Reorder #13

Mesa 0056S (straight) . Stylus slightly bent  
towards rear 

Reorder #1

Mesa 0045M (straight) . Stylus projects ahead  
from arm

4/8/14 Test #11 Miss Danwoodie - Good  
 " #11 amk - good  
 " #7 amk - good little fuller than #11  
 " #14 amk - good and full (Discharged)  
 " #10 amk - good - not quite so full  
 " #4 amk - good - very full (but)  
 " #

4/10/14 Test Richards - Miss D. Good - repressed  
 " #4 - " - Good - very full -  
 " #2 - " - Disposed - full -  
 " #12 - " - Disposed - full -  
 " #8 - " - Good - not so full -  
 " #11 - " - Good - " "  
 " #12 - " - Good little higher than others  
 " #15 - " - Disposed N.B. Same  
 " #2 - ~~disposed~~ seems a little taller  
 " #12 - " - Good, not quite so  
 full as #8 but true in tone  
 " #13 - " - Good. Not quite so  
 full as 12 but true -



May 1 - 1914.

Finished up 6 records for German group.

Tested out records by Miss Demoschke.

Go to Carnegie Hall for Ellery's Band.

Of this

Arthur Millstone - Soprano  
was good. His enunciation was  
fairly good. Little throaty on  
lunatic notes. Accompanist mechanical.

Alfred Rauderti - cello was  
often squeaked on a few times and  
his instrument was very metallic  
and rattling. His accompanist  
was mechanical.

Clarence de Danc-Roger, Violinist.  
Fair, Accompanist excellent. Soft  
touch and with expression.

#5 Buschwald - Shewed excellent

+

May 7.

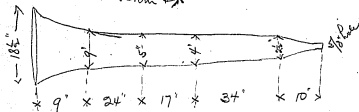
Experiments on Records.

Rusdwalt #1 against #10 Standard.  
This record showed up little thin and  
will be changed.

Experiment on Horn:

Compared experimental horn #1 with  
standard horn. Being same recorder,  
distance, voice and all other conditions  
same, horn #X was much thinner  
than the standard.

Horn #X



May 3.

Get out the new long horns for  
Hermes to try out.

Sent Doyle to New York for information  
on stage props, painters, scenery,  
etc. Obtained

Electric Effects

Kluge Bros - 240 W 50th St.

Paints

Ludwig Chemie - 288 Bway

Stencils

Stevens Co - 29th St & 6th Ave

Costumes (

Horace Miller - 263 S 11th St. Philadelphia

Costumes (not military)

Tams - 1600 Broadway.

Hardware (Base

A. W. Kestner - 4th St & 6th Ave.

Manhattan Co - 24th St & 2nd Ave.

Artificial flowers etc.

General Flowers & Decorating Co

221 W 49th St.

Lynnman tests out camera for focus etc.

Set up camera and Reptel in position

Feed out Arc lamps

Made trial take of pictures

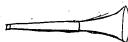
Day in Chelsea  
set took up material  
getting out of  
area of view from N. Man  
H. H. H. H.

May 5th

Tried out recorders on very soft  
back of representatives of Bell  
Telephone Co.

Tried out Special, 1 horns as  
follows. Used Humphrey at 6 ft.

Horn #1 Regular

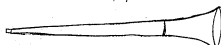


← 4 1/4" →

↑  
23"  
↓

Used Recorder  
(Horns) #10  
on all tests  
Horn #1 as  
standard.

Horn #2 Special

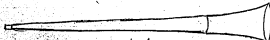


← 5 1/2" →

↑  
23"  
↓

Bell same  
as above

This horn proved much fuller than #1  
Horn #3 Special.



← 7 1/6" →  
Fuller than #1. Not so full as #2. Fine definition.

(15)

Sp/14.

Tests of camera for exposure  
inside with regular  
are lamps.

#1 @ f 4.5

#2 @ f 6.3

#3 @ f 9

#4 @ f 12

#1 gave apparently the best  
exposure.

Test for experience on running  
camera and simultaneous  
recording.

① Mr. Humphreys.

② Miss Dunwoodie (take up failed)

③ Miss Dunwoodie

④ Mr. Humphreys.

Buchwald made up,  
#5 Recorder. Tested little yellower than standard  
#9 " " thinner " "  
#3 " not tested.

Nights. Came back with  
Lynn and made the  
following tests:

Sp/14.

Tests of camera for exposure  
inside with regular  
arc lamps.

#1 @ f 4.5

#2 @ f 6.3

#3 @ f 9

#4 @ f 12

#1 gave apparently the best  
exposure.

Test for experience on running  
camera and simultaneous  
recording.

① Mr. Humphreys.

② Miss Dunwoody (take up failed)

③ Miss Dunwoody

④ Mr. Humphreys.

Buchwald made up  
#15 Bender. Tested little better than standard

#9 " " thinner "

#3 " not tested.

Nights. Came back with  
Gunn and made the  
following tests:

5/5/14

Test #1. Regular Lighting

for lighting top, bottom and side.

At 16-18-20-22-24-26-28-30-32-34-36 ft.

Diaphragm f 6.3.

34 Lamps burning.

Test #2 Same as above except  
Diaphragm f 9.

Test #3 Lights were tilted

so as to increase side

lighting. Object was set

around on stage

Diaphragm f 9

34 Lamps burning.

Test #4 Duplicate of #3 by mistake

Test #5 Same as #3 except

alternate and next to end

Lamps out

Diaphragm f 6.3.

30 Lamps burning

Test #6 Same as 5 except

Diaphragm f 9.

the tests described with positive results per.

5/6/4.  
Cleaned up herby & took pictures.

Fixed up small phonograph  
for recording.

Made tests with Mrs. Dunwoodie  
of machine for album

Committee meeting to act on film.

Examining results of  
last night

Took up matter of getting  
Hawright and some of Stock  
Company in to see talking pictures.

Test of Pierrans amplifier  
arranged.

Buchwald - Assist Harner in putting up machine  
Repairing synchronizer.  
Tested #5 Reenter. Good. 7 feet like #15



5/7/14.

Test of #7 against regular wax

- ① Test of 3 records, #s 10-12-15-  
on each, Humphries speaking and  
his notes on piano. Dubs #5 & 1 being  
sent for Blue Antenna Records from.  
Dubs #2 being paired to compare  
with dubs #1 to compare quality  
of wax with celluloid.

- ② Recording, Humphries - on each  
and dubbed on regular wax.  
Results. The reproduction from the  
regular wax is fuller more resonant  
and better. The #7 wax is apparently  
harder and tends to blast.

Results not however conclusive. It  
may be that #7 wax will be better  
~~when~~ tested under the arc lamps.

Of the record tests

- #10 - Standard
- #12 - Very full
- #15 - Fuller & more expressive than

5/7/14

- #10. Try this with blue paper  
to see if they are sharper.

Made up positive from yesterday's  
negatives. Exposure & lighting seems  
to be good.

Committee of Operative  
Felms. Newton 22-

5/8/14

5/8/14  
Pictures to determine focus of  
lens and lighting

Voice Tests of Mr. Hamright  
and Miss Kennedy.

Shaved pictures to above.

" Went to De Kalb Theatre Brooklyn  
to see about installation - "Nathan Miller."

Went to De Kalb Theatre Bklyn  
to see about installation -

Saw Webb pictures at Finton  
and Laurel-Randow pictures at

Polce theatres. The need-  
exhibition is much better managed  
than ours.

Mark on Transmissions.

Lyman made tests to determine floor line & focus.

5/9/16

Committee meeting of new films.

Got. after finishing up  
dark room.

Buchwald made orders  
#7 shade thinner than #15  
#19 - N.G. took down.

Ryman made tests of regular  
lens against lens in Dr. Hegham's  
Camera.

5/10/14.

Laid out DeKain Theatre equipment.

Tests of Piermans Amplifier arm by Megaw. It is softer and more quality than regular arm at 100 P.P.M. At 150 P.P.M. the loudness is increased slightly but is still not as loud as regular arm.

Ran apur as for French representative. He agrees with us on grading.

Starts Tuttle on equipping  
Kendallphone outfit in studio.

Bachwald put new governor in  
#6 machine & fixed same in  
working condition. Also cleared  
up gears in #6 amplifier.

5/12/14.

Had lamps changed further back.  
Extension pipe made for this.

Strengthened out stage batteries on  
recording machine.

Changed lights 9 ft back  
Get in new floor cloth, grass mats  
Stage luxes etc.

Made tests on Bernans Amplifier Am-  
plifier, better quality and less volume  
with it.

Met Managers from DeLuxe Theatre. Show  
them pictures.

Committee Meeting for Hungarian Jubilate.

Behaved on changing batteries for Bernans  
Marking on #7 Amplifier.

Height tests on Recording Machine.

Night - Hammered much Pyman & Merita back  
3 tests quick. Changed lights for  
exposure. Exposures showed  
static.

May 13/1914.

Tested out two falcow head records  
for Mr. Hermann.

① Sharp and metallic. Not as full  
as standard. Surface little less than  
standard.

② Less sharp & metallic - better  
than former but still not as well  
rounded out and full as standard.  
Surface practically same as  
standard before and after  
amplification.

With Committee - finished  
Hungarian Subjects except  
#186 of which the record was  
bad.

Lynnan made 4 tests with lights.  
Lighting seemed sufficient at  
+6.3.

Tested voices of Mrs. Palace  
M. G. and Tavor - who  
can be used for character tests.

Tuned up "Trapped". Not long  
enough for  $\frac{1}{2}$  and too long for  
1 period. New pen with.

Rachwald:

New needle on amplifying  
machine.

Changed rear holder spring  
arm on reproducing machine.

Made #19 Reson. Not tested.

Lined out new Reflectors.



May 14/14.

Saw Mr. Porter about nitrogen  
lamps and reflectors. He will  
send sockets and reflectors.

Worked on scenery with Powell.

Pyman set up x-ray pictures  
to try lighting and focus. Good  
results.

Checked up DeKalb Theatre. Seems  
to be in good shape.

Committee meeting at night.

Bushwald:

Set new needle in #7 amplifier  
arm.

Made new needle arm for #6 machine.

Tested out Pyman's new amplifier  
arm. Better quality and less loud  
than regular.

May 15 - 1914.

New reflectors on and try aluminum.

Test of Girman type amplifier lens  
arr. Good results.

Committee meeting for  
fifth Russian installment

Made test run of feature

- ① Humphrey - Lecture
- ② Miss J. "East Coast of Sumner"
- ③ Doyle - Song
- ④ K - Chimes.

1st run. - Take off of camera -  
clipped on 150 ft. Nerns  
#12 recorder. Too full. Blasts.

2d run. Nerns #10 Recorder.  
Still loud & little plastic.

3rd run. Radio out Kinosphone  
Repeating mechanism.

Ran Operco id. Film. Phonograph  
patterns. Pulley bad.

Lynian submitted test of film -  
fine.

---

5/16/14

Committed on # 186 A.

Finished up Dark Room & got in  
paraphendia.

Got in mirrors.

Negative of yesterday's takes.

Bushwald.

Repair Tripod.

Amplify Tracker Blanks.

5/18/14,  
Committee meeting on Sixth  
Russian Installation of  
Pictures.

---

Started Pinner on new set of  
Scenery - paneled library &  
pavilion set.

---

Made take of improvised lecture  
completing no apparent hitch.

Reichwald reports  
General Work on Scenery,  
Amplifying  
Testing Record # 19. Result  
same as #15 which is a shade  
fuller than #10.

---

Tested Blue Amplifier against  
Wax records. Blue Amplifier is  
a little sharper. Found also  
that a record which is full &  
tutty in the amplifying room  
is only good in the large room.

Tests of Metal-Hydroquinone against  
*Rodentia devespino*. The m-d is  
apparently much better.

---

5/19/14

Get ready for Lecture telephone  
talent = play etc.

Lay out Arch for new scenery.

Hahnes man & arrange for  
props.

Committee meeting on  
the Russian Installation.

Fixed lighting tubes with still  
and old moving picture  
camera.

Bushwall:

Made Resistor #13 shade thermometer 15

" " #17 " " 15

Experimenting on light amplifier  
arm.

Made new amplifier arm.

5/20/14.

Prep for the Lecture.

Recd of Glass Head Jr.

Set up & tried out complete Limbophone apparatus. Phonograph shows up weak for this place.

Buchwald:

Experimenting on Amplifying Machine  
Recording with various Records

Made Record #6

Synchronizer on Projecting Machine  
put in working order.



5/31/4.

Experimental work on aluminum  
amplifier arm. Good quality but  
deficient in volume.

Lay out method of continuous  
recording.

Recorded & took pictures of Mr.  
Head - heavy ~~low~~ voice.

Ran reel & record of second  
lecture. In and out focus  
due to printing green glass  
flashing light which must  
be removed.

Prepared for Committee Pictures.

Ran Talking pictures for M.P.A.

Bruchwald: worked on new  
aluminum amplifier lens  
arm.

5/28/4.

Experimental takes of lighting

Get second camera ready for outside silent pictures.

Get wall paper for scenery use in place of paint as usual.

① More decorative on account of pattern.

② Chicken to sit up.

③ Soften effects.

Hutchison over. Showed blue card compared with wax and #7 wax against standard. Requested additional blanks for test.

Take pictures of Maxwell & MacKenzie.

Next to DeLaub Theatre at night

Quahward Experimenting on amplifier arm - new fusion piece in gamma of ~~refraction~~.

Amplifying tested blanks

Strahl.  
Tests for fighting

Saw Bob left about week.

Got painter and to new-york to  
see White on scene painting.

Saw Reubens on new foreign  
subjects from Austria.

Bruchwald. Testing & changing batteries

Spool

Change lights & test new lighting.  
- Run trial against 1 run -

Print Pinner to Famous Players Studio  
New York. Came back in afternoon.  
Keep him on present set.

Made tests of Victrol Records and  
Nelson, Edwards & Barnet of the  
Edison Quartette.

Requid furniture from Hobbs.  
Set up to determine stage room  
needed.

Buchwald:

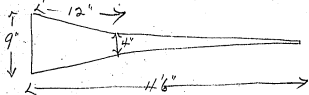
Experimenting on Amplifying  
Machine #6, new needle arm.

Keefe & Norris put up Studio  
outfit.

Night: Projected picture of  
Nelson singing bear song.

5/26/14.

Experiment on 2 hams by Nerner.



#11 horn was made of zinc  
#18 " " " tin  
Both were weaker and thinner  
than regular horn as used.

Remainder of material secured  
from stables & put in position.

Visit from Mrs. Jacobi concerning  
prophets. The claims -

- ① That the matter of props in the larger studios is exclusively men and that the regular property men are getting money out of it.
- ② That not enough attention is given to the props.
- ③ That studios should have as large number of fixed props

as possible and put only their  
special stuff.

Made test of Geo. M. Head Jr.

Made tape of 6 minute sketch

① Geo. M. Head Jr. - Turnkey song.

② Miss Danvers - Last Rose

③ Bob Felt - Crosby on Oh Promise Me.

Made tape of MPTX close up  
in chair.

Reinforced Repaired the 2  
reproducing machines.

Experimenting on amplifying arm  
of #6.

---

5/27/14.

Experimenting with diffused lighting from  
white reflecting surfaces. Used  
Photo Engravers lamps on large screen.

---

Experimenting with arrangement  
of pits to get best results.

---

Experimenting arrangement of  
camera and theinograph for  
taking close on objects.

---

Made take of Hutchinson close up.

---

Bushwald =  
Repairing Motor on Reproducer = 7  
" " belts on regular reproducer.  
" " Retards.  
Assisting Warner..

5/28/41.

Revised brought up titles to be made.

Looked over scenarios that Humphrey left with hat & selected four that may be used.

Ran takes of pictures made.

Experimented with reader of Mr. Hughes.

Tried out new reflector & ordered 10 for two week rows.

Made reflecting screens for lighting.

Loaned Jim White 100 ft film.

Bushwald:

Repairing Recording Machine #7.

Assisting Warner.



June 1, 1914.

Revised orders to make Portuguese  
Lecture & Portuguese Faust.

Laid out outline of Lecture. Got in  
touch with Humphrey for talent.

Got scenery & props ready for Lecture.

Shaw's Павел, Werner's Pognan, English  
Faust for comparison. Laid out scenery  
etc for Portuguese Faust and ordered material.

Had English Faust written up for  
translation into Portuguese.

Got after special records lenses for Higham.

Test of alternating current light for Meschery.

Bushnell:

Synchronizing Pulley on #6.

New amplifier needle on #7.

Repairing recording mask #6.

June 8, 1914.

Saw Humphrey about putting on Portuguese  
puzz. Made 10<sup>th</sup> per day.

Note parties about Portuguese talent. Got  
in touch with MEX on same.

Ran picture of MEX. Pretty good.

Got new reflectors. These seem to give  
a great deal more front, shot in  
light and are good and soft.

Got English of Faust for translation.

Experiments on new amplifier  
arm. This is now better than the  
standard. It gives a crisper,  
fuller record.

Richwald Work on Amplifier #6  
Testing gun on synchronizer  
Testing stop recording.

June 3-1914.

Work on scenery for Faust

Record of Mr. Mr. Cole, 66 Congress  
St. Newbark, N. J. - Slang, tramp,  
strangler parts. This man has fair  
appearance and articulation. Voice  
not heavy and loud enough to  
fill theatre.

Method of Marguerite and Cross  
visions in Faust worked out.

Another call by Mr. Jacobi. He  
made some new points among  
one a good one or so.

- ① In taking pictures take some  
natural effects if possible.
- ② That the long, uninteresting  
feature film is bound to go  
and that short thrilling films  
will be the permanent ones.

Bushwaad:

Made usages for amplifying  
machines #5, 6 and 7.

In recording and amplifying - practice  
~~step~~ recording machine for ~~step~~  
recording change of code number etc.  
More recorder which has not  
yet been tested.

June 4, 1914.

Tests of lighting on portrait taking  
picture of our model. Need casing  
cell so we can project these here.

Getting scenery ready for Faunt.  
Frame work of arch, cross background  
and a background panel finished.

Met Mr. Maxwell & visitors and  
made phonograph records of them.

Got finished copy of Faunt  
scenario. Take to Hammond to  
take to Polyplot Co for translation.

Practising tape recording.

Projected new picture taken. Lighting  
is better but still harsh & predominates  
on top.

Rushward Tracing cloth thread locaters  
cleaning roving recording machine  
about them in recording and  
amplifying.

Project of the  
of the  
of the  
of the

6/5/14.

Hammond to New York after talent.

Experiments on lighting for  
portrait taking pictures, using  
magnesium lamps for lower  
and front lighting.

Made tape of Sel. Lett in  
taking portrait.

Had. Bless piano tuned.

Made test of M. Head Jr.

Richard:

Inspect & clean reproducer #6  
Loose connection between diaphragm  
and shoe.  
Assist Werner.

6/17/14  
Experiments on new diaphragms  
for recording



# 30

Main mica diaphragm standard  
diameter .005"

Over this second diaphragm .006  
thick - 1" diameter -

Both cut through with  $\frac{1}{2}$ " diameter  
hole. Piece of aluminum  $\frac{1}{8}$ " diameter  
.0075" thick stuck over with solution  
of Canada balsam in benzol.

Gives tone just as loud & more  
human quality, fuller & not liable  
to blast as compared with #10.

#5 Another made similar but with  $\frac{1}{4}$ " hole  
&  $\frac{1}{8}$ " aluminum. Similar results.

July 7-1914.

Mark out with Mennen on reamplification. By careful pressing of the stylus to avoid surface as far as possible this can be done.

Dubbed - amplified masters of the five Vienna subjects which were weak and made them much louder - loud enough to be commercial.

Dubbed "Mrs. Murphy's Haveshee" which before was weak.

Tested out "Panachrome" lanterns are light from Allerson & Hadaway, 235 5th Ave. New York City.

This is a very light, compact, lantern form of are light. Is rather fragile and delicate. Its actinic power, on test was slightly less than that of an Aristo are, and much less than that of an Engstrom's are. The light is well distributed however and on account of the lightness and portability of this lamp I think it will prove useful.



Tested #226A-B "Nippon Jale  
Jan Joseph Balogh" from Berlin.  
These records are good and loud.  
The recording and surfaces are  
both good.

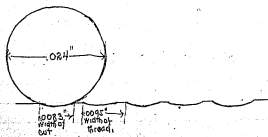
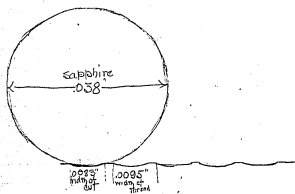
Tested 16" telephoto lens on  
regular motion picture camera.  
Difficult to adjust as this lens  
requires about 10" focal length  
for good work. Lyman also  
made curious discovery that  
it was impossible to focus  
this with regular focusing  
microscope. Don't see why. Must  
use this lens back on stairs to  
get good picture.

Lyman fitted 75 mm. lens from  
Kymograph Camera on regular camera  
for portrait work.

July 23-1914.

Experimenting with recording with .024" stylus. This has several advantages

① In deep recording of heavy notes it does not trespass so much -



cut shows this.

- ② That for magnification (using .024 sapphire x .001 diamonds), as at present only one amplifying machine is required in place of 9 as at present.

After several trials, Warner made a picture apparently as good in quality as standard which .028" sapphire.

Records made Bob Pett singing, Amx. at piano.

Lyman made pictures from Gludis cylinders with 15x7 camera set up as same object camera moved  $5\frac{1}{2}$ ". The 5x7 prints were cut to  $3\frac{1}{8} \times 3\frac{1}{8}$ ". Then mounted side by side it was practically impossible to make them appear stereoscopic to the unaided eye. Then cut & mounted about  $1\frac{1}{8}$ " apart they appeared stereoscopic to the unaided eye after gazing at them.

for a time.

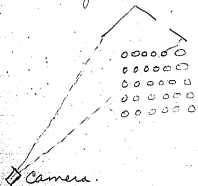
July 24.

Memo made new records with 50¢  
sapphire. The quality is excellent,  
surpassing anything I have yet  
heard on the kinto-phone.

A comparison of these with  
"College Days" made the latter  
sound weak and phonographic.

Lyman made other stereo negative  
plates with camera 26" apart.  
Did not print.

Lyman arranged new set up  
with lights on side -



Camera.

made exposures. These seemed to show that wide open lens was necessary. Tests showed good focus but good soft lighting.

Planned with human & animal scenery for Hales of Holloway and ordered material & made diagram of scene to send to get sizes.

July 25-1911.

Ryman made further tests with  
side lighting prism.

---

Nelson built up new readers and  
mounted specimens on new recording  
arms.

---

AMK. - afternoon worked on  
theory of stereoscopic photography  
of mounted photographs.  
Proved that the photos taken 26"  
apart would not work stereoscopically.

---

July 27, 1914.

George Nemes made new recording  
heads and further trial of 024 records.  
Got some excellent results - more natural  
than formerly.

Ran Littere taken with lights arranged  
as shown. 1/20 f/11. Results not good.  
Focus bad and lighting was hard  
and certainly in place of what was  
looked for.

Lyman sick in afternoon. The  
down arrangement as above and  
rearranged lights to same as in  
Portuguese lecture.

Got a new position but did not  
get them.



July 28, 1911.  
Set up & ready for Muespina & Miss  
Clark invited also.

Showered between 10 & 11 p.m. Took  
trials of Muespina's camera. On  
account of darkness Muespina &  
Renzler did not appear & could not  
take picture.

New reflectors came operation. Made  
trial take with them #3 @ f6.3 -  
#4 @ f9. - #4 @ f11. sent to Paulsen  
to test & report on what exposure.

Made up some film, securing screen  
for camera. Kippen did not like  
because they hobbled.

Charles Marti sent over by Farrell.  
Designed. Kitescope for Sloan & Chase  
Saw him about. Could not employ.

7/5/41  
George Heron made up new readers  
and tested out with results not shown  
on "Come Back to Green". Excellent  
reproduction.

① Lyman made prints from scanning  
negatives. Set up camera for  
test re new reflectors.

② Set up at angle as shown  
7/7/41 made test take, new reflectors.

③ Set up straight as ① but with  
5 Photocopying arcs on side  
and made test take & sent to  
Kendall to develop & print.

Letter from R.B. Co came with  
Halophane & enamelled metal  
reflectors to test. Made three  
pictures with 1000 watt - 500 volt  
1/4 watt per sq. nitrogen filled  
tungsten lamp in following order.

①	Halaphane #1500 Reflector	50000
②	D-Oler Reflector	" "
③	No reflector	" "
④	"	58.5 "
⑤	"	55 "
⑥	"	57½ "
⑦	"	60 "
⑧	"	62½ "
⑨	"	65 "
⑩	Arists Arc Lamp	
⑪	No reflector	67½ "
⑫	"	70 "

Then made up & took out 3  
new recorders. Bob says "Same  
back to him" which went fine.

These recorders now have about as  
little surface as possible amplified  
only once in regular ways

7/28/14.

Lyman developed 17 plates made by  
Potter of test of tungsten lamps

Of these #'s 1 and 10 appear nearly the  
same density so that results with  
the Halophane reflector are  
encouraging. These lamps are  
however built to burn vertically  
only so that to be useful they  
can be used only for overhead  
lights. What is needed for this  
work is a lamp which can  
be equally arranged to put light  
into the scene from the front.

Had mirrors for stereo experiment  
framed in Mr Mudds shop.

Saw test of film made with  
all new style reflectors on  
Auto lamps. Shows improvement  
in diffusion over old style  
lamps.

Experimental results on brass  
aperture plate with steel pack shows  
that no static has been experienced  
since using this and no pictures  
have appeared out of focus.

In case of #1 Camera with steel  
runners as usual, no trouble  
from static has been experienced  
but emulsion sticks to steel slides  
if the least rough.

Hereby made up records as  
follows:

#30 - Sapphire .004" diam.  $\times$  .075" lap.  
Mica .004"  $\times$  1 1/2" built up center  
of gap. Paper disc .005"  $\times$  1/8"  
2 gaskets - mounted with wax,  
and resin.

#70 - Sapphire .004"  $\times$  .075"  
Main diaphragm mica .005"  $\times$  1 1/2"  
Secondary - under it .005"  $\times$  1/4"  
2 gaskets mounted with wax  
and resin.

On trial both compound mica with  
#10 Standard.

Arrived at New York in afternoon  
to see Calhoun - Nelson about  
pendgins from Reynolds Rushes  
& others. Asked them to get price  
from him and from Dickson  
Harris on pendgins for the  
Collins & Carlan sketch.

July 21, 1914.

Made test to show difference in color value of make ups. using light yellow (Powers) Medium Yellow (Brachwald) Dark yellow (Kennedy) (Pink) Negro-light (Doyle). In this Benjer played piano and Solik felt sang. "Come back to Erin". Benjer, Brachwald & Cuman had on no make up.

Picture (test) showed up well - clear & distinct, yet not harsh. Screen showed up good. No apparent difference in color value of make ups on Powers, Brachwald, Pink & Kennedy could be seen.

Perseff now made tests to determine if 024" or 024" records were better. First trial seemed to show that the 024" issued "blubblen" on high notes. Subsequent trials using the best of 024" and best of 024" records. Solik seemed to show that

The latter gave better quality.  
Lyman made alone test and  
cleaned cameras.



8/1/14 (Saturday).

Bob Rest did not come. Nernis made  
no tests but built up new record.

Nernis made 18 prints from still  
picture of Rest of Maknups.  
More difference on still than  
on moving picture.

8/8/14.

Nemus has determined that comparing records with 028's 024" sapphires, both at 100 R.P.M., that the 024" was fuller & more natural. Making the same records at 100 R.P.M. made the one taken with 028" sapphire sharper but did not change the 024" so much if at all.

Nemus made records with #30 Records 024" sapphire at 60-80-100-120-140-160 R.P.M. - amplified them at 80 R.P.M. & reproduced. Bob left singing with piano accompaniment made. The singing at 60-80 & 100 R.P.M. a little sharp and metallic. Rest good. The piano seemed good on all except 160 R.P.M. which seemed a little full & having too much resonance.

Lyman made exposure of reflecting mirrors for stereoscopic photography experiment. Plate taken at 1/250th sec showed lack of depth &

sharpness. (Due to thin mirror  
mounted in frame. Probably becoming  
warped & has imperfect surface  
to begin with.

Ryman worked with Eason mounting  
lenses in camera. We get Bellmeyer  
#19 lens tomorrow.

Get ready to take Miss Elizabeth  
Spencer tomorrow.

Received model of starting  
device for a/c asynchronous  
motor for shaving machine  
from Mr. Simpson.

8/4/14.

Made 2 takes as Miss Elizabeth D. Spencer giving short recitation on marriage and song "Mud Pie". Test of photography showed up well and the speaking part of the recording was good but with Rungles at the piano - there was interference between piano and voice which showed up both in tests and in records. Ray Campa made Opera for her with which she was much pleased.

To test out reason for above interference. Bob test sang - just as done at Twilight - and at piano same position as when Miss Spencer sang. No interference. Piano was brought closer. Still no interference. Was played louder. Still no interference. Changed to Church hymn so that hand full of notes in middle and lower piano register were used with great force. Still no interference. On other words there was interference.

between Mossbauer's voice and  
plans even which experienced players  
great care and no interference between  
Calk Kettovoice and piano even  
when efforts were used to secure  
interference.

Revised Dagelmeier 75mm  
lens from Laboratory & tested.  
When lens is open f1.9 has brilliant  
illumination of ground glass  
and apparently good depth  
of focus. Tests made with it  
seem to show good illumination  
and excellent snappy image  
but less depth of focus than  
the Helios lens used.

**Notebook Series -- Notebooks by Experimenters Other Than Edison  
Kinetophone and Kinetoscope Experiments -- A. M. Kennedy Books  
Notebook, N-14-01-21**

This notebook was used by Absalom M. Kennedy during January-May 1914 as a record of experimental work on kinetophone and phonograph recordings. At the beginning of the book are notes on voice recording tests to determine optimal stage directions, positions for actors and props, backgrounds, costuming, and stage size, as well as to establish procedures for testing exposure, focus, sound, and lighting before filming. Also included are entries describing changes made to kinetophone parts or procedures, such as amplifier lever arms and film developing formulas. Near the end of the book is an entry bearing the title "Record of Recording Quality of Actors Voices from Mr. Edison's Record," followed by additional entries containing evaluations of male and female singers at the Century Opera House. Employees who participated in the evaluations include Kennedy, O. Bing, Clarence B. Hayes, and Alexander N. Pierman. Numerous instructions, comments, and suggestions by Edison appear throughout the book. The front cover is labeled "Kinetophone Studio Work." The pages are unnumbered. Approximately 25 pages have been used.

KINETOPHONE STUDIO  
WORK.

①. Preliminary Tests and  
Information.

Report of 1/21/14 on Foreign  
Studio recording contains

"Voice recording tests should be made  
of all prospective actors and those who  
do not record well should not be used  
for Kinetophone subjects." A record book  
should be kept embodying the result of  
these tests and these results should  
also guide the stage director in  
placing his actors; those with the  
weakest voices being, as far as possible,  
placed nearer to and more nearly  
facing the recording horn.

To this Mr. Edison added the  
following note:

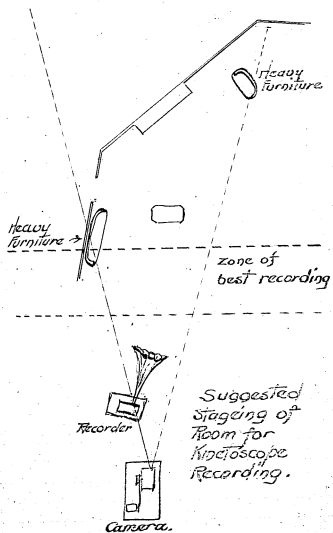
"Test records of an actors voice by  
reading something from a book, then  
the record is to be reproduced in  
presence of at least 3 persons who do  
not know what is recorded and

who are totally ignorant of the subject matter". If we get 100(%) of all the words, then the actor can be used. E.

Further from above report:  
"Actors should be instructed to speak as distinctly as possible and louder than for ordinary acting and should as far as possible face the recording horn."

"The width of stage should be small so that the recorder may be as close to the actors as possible and a good lip movement will be given. Apparent breadth may be given the stage by the use of heavy furniture at the ends and by the use of "perspective" angles in the settings as shown in attached sketch". The stage may be made as deep as required provided the speaking actors be kept in the foreground near the recorder.





"When the stage is set up before any Kinetophone subject is taken, trial strips of film should be taken to determine the proper exposure and focus. At least some of the actors should be in this trial take in the costumes they are to wear.

"Before taking any subject in a new place, trial records should be made with the camera to determine the acoustic properties of the place, so that any echoes or other extraneous sounds may be eliminated."

On which Mr. Edison notes:  
"The echoes become more disturbing the further the actors are from the floor but canvas and carpets stop it."

"Echoes in room, if bad, can be eliminated by using scenery painted on canvas floor & stage, thick woven carpet & canvas sides to room."

### BACKGROUNDS.

"Backgrounds should be dark. Painted scenery should be in dark colors, plain or with a small, repeated figure. Sepia or an equivalent brown makes an excellent background color. A skyline background should be avoided."

### LIGHTING.

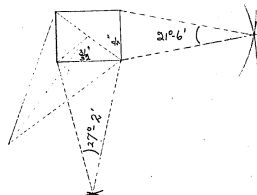
"The amount of light must be sufficient for the photographer to get correct exposure with stops not larger than f55. Preferably smaller. This light should be evenly distributed, so that all parts of the stage are equally illuminated and must be well adjusted to avoid harsh shadows. "No light, direct or reflected, should shine in the camera."

### DRESS AND DRESSERY.

"White, should never be used, light or canary yellow being the lightest permissible color. The medium shades make best

photographs. The photography  
must bear in mind also that the  
blues photograph lighter and the  
reds, darker than they appear to  
the eye.

ANGLES OF A 2" LENS.



Amplifier Lever Arms  
Changes made.



When made by drawings, it appears that the relative distances from center to heel and center to sapphire on amplifier lever arm are not correct and should be as shown. To get this distance the heel extension should be cut as shown and bent back until these distances are obtained.

---

Formula for developers -

EDIMOL

Solution A.

Edinol 31 grains.  
Sodium Sulphite (dco) 155 "  
Water 3 1/2 oz

Solution B.

Sodium Carbonate (dco) 155 grains  
Water 3 1/2 oz

For plates and films

1oz A - 1oz B - 2oz water

For Bromide and Dekt Paper

1oz A - 2oz B - 3oz water & sufficient

10% Solution potassium bromide to keep  
whites clear

More A than B increases contrast.

More B " A " softness.

Underexposures - 1oz A - 1oz B undiluted diluting

Over exposures - Potassium permanganate drops  
of astonesulphite 5% solution.

Bronx Studio Trials

Miss L. Bourne-	Edison gets 20% only	Hayes gets only 30%	N.G.
Miss Viola Knott	Edison 40%	Hayes 50%	Explosive-uneven
			N.G.
Fred. Roland	Hayes 60%	Edison 40%	Poor phone voice -Explosive
			N.G.
Lawrence Atthomson	Hayes 50%	Edison 50%	Uneven-unatural -Explosive- Not Good

*Ed. Hayes 5/2/10*

*Hayes.*



Record of Recording.  
Quality of Actors Voices  
from Mr. Edison's Record.

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FEMALE

- ① Laura Bennett:  
705 - W 170<sup>th</sup> St - Tel 3388 Audubon  
New York

"Perfect articulation": Edison & Hayes  
"Best ever heard": Edison.

- ② Alice Knowland  
Fort Lee, N. J. Tel 397m. Fort Lee

Hayes 100% - Edison 95% OK

Mr. Kennedy-

The following two cylinders have been passed for the disc  
Mr. Edison remarks that they "will be good for kineophone."

John C. Thomas - Baritone - (Olympic Park Opera Co)  
Fine articulation -  
Albert Farrington - High Baritone - 220 Hudson Ave - N. Y. City -  
Good articulation -

C. E. Hayes - 6/14/14

③ Miss Margerit Edison  
311 W. 94th St., - Tel 5015 Kew-Forest  
New York, N.Y.

Pierman 100% - Hayes 100% - Edison 90%  
"Her hissing consonants are pretty  
strong and think they will go thru  
our process".

Higham used her for first time  
2/20/14.

④ Laura Dean  
311 W - 55th St., New York, N.Y.

Edison 90%. Hayes, all.  
"Cracked vaudeville voice". OK for  
comic parts. "Voice will come pretty  
well on Kinetos".

⑤ Nellie Grant  
% Edison Studio  
New York City

Edison 80% - Dayer all.  
"She is pretty good".  
Used in The Redemption  
Which Shall It Be  
Dutch Courage  
The Dedication  
Jacko Jake  
Myo Marchip  
The Rungler  
The Rudio Search  
Six Cylinder Copement

Mrs Robert Newb Lawrence  
253 - W. 56th St. N.Y. City  
Phone 127 Columbus.

MALE

- ① Ben F. Wilson  
96 Edison Studio, New York City.  
"all 100%". "This man is O.K."

- ② Chic Bernham - Comic Opera Comedian  
231 W. 52d St New York City.  
"Bernham, Nays myself get 100%". "OK"

- ③ Edward J. Peel  
211 W. 159th St New York City  
Bernham 100%, Nays 100%, Edison 100%  
OK for talking.

- ④ Jerome J. Shine  
38 Rucklows, Nelson Mandela, New York City.  
Nays 100%, Ring 100%, Edison 100%  
OK for talking.

⑤ Bob. Litt 96 Washington Ave N. Orange  
381 E 2005 New York City  
Purman 100%, Hayes 100%, Edison 95% OK  
I have used him a number of times

⑥ Walter Cluxton.  
334 W. 46th St. N. Y. Telephone 3967  
Hayes, 100%, Edison 95% OK

⑦ Henry Netman.  
549 W. 34th St New York City  
Hayes 100%, Bing 100% Edison 95%  
OK for talking

⑧ Harry Knowles  
476 W. 146th St New York City. Phone 3910 Audubon  
Hayes, 100% - Bing 95% - Edison 95%  
OK for talking

⑨ Louis Demush  
499 Pine St., Providence R.I.  
Hayes 100%, Edison 98%  
"Singing only, dir. - has tremelo - but  
singing articulation fair - ok for talking -  
- possibly for singing certain things but not  
in chorus as tremelo gives chorus work."

⑩ Bernhardt Lee Meyer - Conductor  
219 E 52<sup>nd</sup> St. - N.Y.  
Pierman & Hayes 100%. Edison 90% OK

⑪ W. B. Mainright  
253 W. 55<sup>th</sup> St. New York City.  
Pierman 100%, Hayes 100%, Edison 90% OK  
Regular Edison Studios Actor. Has  
played in "talkies".

⑫ E. F. Cochran (American)  
Club, New York City  
Hayes 100%, Bing 90%, Edison 90%. Pretty fair

(13) Louis Arnold  
122 W 49th St. Radio Burtal - New York City  
Rumann 100% - Hayes 100% - Edison 90%  
OK for talking

(14) Herbert Grape Tel 680 Beth  
1449-62d St., Brooklyn, NY Beach  
Edison 90% - Hayes All. "Pretty Fair Voice".

(15) Duffield Van Diney (Bronx Studio)  
Phone 9995 Columbus  
Hayes 100% - Bing 100% - Edison 75% - pretty good.

(16) C. Dumbly  
205 W. 107th St New York. Tel 1000 Riverside  
1st part reading natural verse E 100% H 100%  
2d " reciting E 25% H 50% - Stage voice N. G.

Robert Melik Lawrence  
253 - W. 55th St. N.Y. City  
127 Columbus.

L. J. McCormack,  
305 Ave O  
Brooklyn, N. Y.  
Phone 5868 Hildewood.

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George Winter,  
58 Clark St  
Glen Ridge, N. J.  
Rand = 3857.

Mr. E says "Geert Hutchison  
is a fine singer for  
Kinetophone". "This man has fine  
articulation".

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John C. Thomas, Baritone (Opera Co)  
"Fine Articulation" - Edison  
Good for Kinetophone - Edison

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Albert Farrington - High Baritone  
290 Wadsworth Ave, N.Y.C.  
"Good Articulation" Edison  
Good for Kinetophone Edison.



Opera Singers at  
Century Club House.

Female

Lisa Emmel - Soprano. Good voice.  
Very pretty. Acts natural  
and sweet. Not stilted.

Kathleen Howard - Contralto. Good voice.  
Showed record well. But  
Acts dignified and sweet.

Emilia Clay - Soprano. Fair voice.  
Saw as wife. Could not judge  
looks. Acting only fair.

Marguerite Sullivan - Contralto. Over  
good in notes - at higher range.  
Large woman. Not especially  
good looking or good acting.

Berta Shalep - Soprano. Good voice.  
Fairly good looking. Not  
good acting. Shakes her  
head too much.

• Florence Baughman - Soprano - Rich  
voice but probably unused  
not trained well. Mouth  
poorly shaped and will not  
be able to enunciate correctly.

• Cordelia Pacham - Contralto - Fair  
voice. Not especially pretty.  
Stiff in acting.

Jayne Schubert - Contralto - Good  
Voice - Good look & figure  
acts natural & well

Judy Scott - Soprano - Fair Voice  
Fair looking, Good acting

Singers at Century  
Opera House  
Male.

Morton Adams - Baritone - Good voice  
and excellent enunciation.  
Large man. Good actor

Arvieve Harold - Tenor - Good voice.  
Looks & acts well

Louis Krizler - Baritone - Fair voice  
Looks fair. Acts well

Thomas Chalmers - Baritone - Good voice  
Looks well - acts well

James Davis - Tenor - Fair voice  
appearance & acting

Natalie M. Hatley - Tenor. Good voice  
appearance & acting

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① Signor Manuel Carvella (Portuguese)  
263 Regal St., Brooklyn, N.Y.  
Phone 98 Main.  
Made Dia. #10 - Apr 27/44.

② Mrs. Robert Kelt,  
90 Washington St.,  
West Orange, N.J.  
Made Dia #10 - Apr 28/44

③ Mrs. Dorothy Kennedy }  
W. R. Wainwright }  
Mich. Truck Company, Orange, N.J.  
Ruthe Plaza.  
Made with Dia. #10 - May 10/44.

④ Ed. M. Fawcett  
346 E. 34th St. Brooklyn, N.Y.  
Phone Blatnick 8861.  
Diaphragm ① #10 - ② #12  
May 13/44.

⑤ James P. Gilch,  
64 Belmont Ave, Newark.  
Diaphragm #10 - May 15/44.

⑥ Tests of taking for A. G. Bell.  
Diaphragms ① #10 - ② #2  
May 5/14.

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**Notebook Series -- Notebooks by Experimenters Other Than Edison  
Kinetophone and Kinetoscope Experiments -- A. M. Kennedy Books  
Notebook, N-14-08-05**

This notebook was used by Absalom M. Kennedy in August 1914 as a record of experimental work on the kinetophone. The early entries relate to experiments to determine how variations in speed and amplification affected the quality of the recording. Also included are notes on setting up scenery and making test exposures in order to determine the best focus and lens. In addition, there are tests of various screens and screen mounts, as well as new starting devices for the shaving machine motors. Several entries specifically indicate that the work was being done for Edison, while others mention experiments on stereoscopic photography performed for Charles Edison. Some of the entries are related to the experiments documented in Notebooks by Edison and Other Experimenters—Recorder and Recording Experiments—A. M. Kennedy Books. The notes indicate that L. E. Hammond, Daniel Higham, S. G. Langley, Charles W. Luhr, J. O. Lyman, George J. Werner, and employees named Buchwald and Essner were involved in similar work on kinetophone recording. The front cover is labeled "Daily Record of Kinetophone Experiments from Aug. 5-1914 to." The pages are unnumbered. Approximately 35 pages have been used.

Aug. 5-1914.

Experiment with records to test difference in quality at different speeds of recording and amplifying.

Used Ralph Hart singing "Come Back to Erin" with Amf at piano.

Recorded at 60-80-100-120-140-160 R.P.M.

Amplified these double at 80 R.P.M. each time.

Then amplified them double at 40-53-66-80-93-117 R.P.M.

Results as follows:

60-40	-	Voice metallic & raspy, Piano good.	
60-80	-	Voice very metallic & raspy	" "
80-53	-	Voice metallic, better than 60	" "
80-80	-	" " louder than 80-53	" "
100-67	-	" trifle " better than 80-80	" "
100-80	-	" little " " 80-53	" "
120-80	-	" good	" better full.
140-80	-	" good, louder than 120 - Piano good	" "
140-93	-	" fair - loud	" "
160-80	-	" good	" "
160-117	-	" fair, louder than 160-80	" "



Put up set for Tales of Hoffman.  
and made short takes.

Made portrait, full stage and  
outdoor exposures with 75mm  
Dallmeyer lens. This lens lacks a  
bite in depth at f5.6 as compared  
with "Helios" lens.  
At f6.3 does not lose enough to  
be objectionable unless with  
very deep stage and prolonged  
action at peak. Outside test  
satisfactory. Suggest getting  
a 50mm lens of same make.

Aug. 6, 1914.

Rushward arranged double cameras  
for Chas Edison's stereoscopic  
photography take.

Ran takes including Elizabeth  
Spencer and Bobbette in "Come  
Back to Erin". Photography on these  
is excellent - apparently the best  
we have done yet - lighting soft  
and even, every line of face -  
each hair of head ~~show~~ distinct  
clear white shirt front on  
Bobbette evening dress did not  
even give any halation.

George Werned off on vacation

Tests of 75 mm. Dallmeys lens  
on comparator showed up same as  
previous reports. Good sharp pictures  
little less depth of focus than Coughey lenses.

Lyman made positives of recent negatives.

Hammond tested out new starting  
device for a/c shaving machine  
motors. Made 1200 starts without  
a hitch. New pedestal hangers  
designed to keep from catching springs  
when revolute backwards.

Tested out scrim screens in front  
of regular aluminum screen. Cuts  
out directional reflection but  
cuts down light and gives uneven  
silk effect. Will mount differently  
so as to vary distances between  
screens.

Aug. 7, 1914

Set up made test of two camera  
method of stereoscopic photography  
for Chas. Edison. 60 ft of negative  
used for each picture.

This involved adjusting the focus lines  
of the cameras exactly and aligning  
the cameras so that the principal  
subject exactly corresponded in each.

Tested out means of coating the  
wooden strips of developing racks  
with celluloid lacquer so that the  
developing solution would not  
penetrate the woods.

Had foreign studio outfit brought  
over and locked in room.

Aug. 8-1914.

Studio rather disorganized due to  
men leaving and half holiday.

Checked out material and work  
left with men and planned with  
some of them about work.

Aug. 10/14.

Took down apparatus of stereoscopic photography test and put up cameras for a take.

Saw negatives of stereo experiment. One little denser than the other. Paid out printing scheme.

Bernon worked on double amplifying. Test with Bobbitt's camera. "Heard Bowled Down". N.B. Manner of photo. Amplified old 1st dubs - showed up good.

Another Record same "Come Back to Erin". No waves. One Jump Out. Not much - not up to usual strength. Unable to explain.

Saw Rich about place for Oswald.

Aug 11 - 1914

Made tests and a take of Miss Mary Jordan, 533-W 117th St.

Tests showed bad interference between pigns and advice. This was in part eliminated by changing the geocompensation to an octave higher for the right hand than was wireless. Record as made was not as good as has been made.

Permer found that the sapphire ball of his amplifying machine was loose. Also that the bearings were too tight.

Afterwards made excellent records of John. Pitt. singing.

Points brought out here were:  
①. Inspection of all machines including recording heads, amplifiers, lever arms etc before making records.

- ② Need of carefully selecting the number and duration of the accompaniment. If this is in middle register of the Piano or contains lot of notes played together, especially with octaves, the accompaniment should be changed to an arpeggio one and the right hand middle notes raised an octave higher.

McChesney telephoned over to find what a record would cost for law & Langer for a mob scene. Also for three records taken at 10 ft or more. He sent to the Bell Telephone Company.

Lyman found that shutter on camera does not allow aperture with narrow angle lens. Essner made a new and wider one.



8/12/14.

Made tests with George Nemes  
and trouble with recording.  
Got some excellent loud records  
with Bobb test.

Made up estimate for McKeeney  
about making record for  
Blaw & Glauert.

Ren Chas Edison stereoscopic  
feature. Veryumpy from  
3 causes;

- ① Cameras 10' apart.
  - ② Inaccuracy of setting cameras
  - ③ Inaccuracy of printing positive.
- Discussed with Chas Edison  
another method of taking.

8/13/14.

Now made up new recorders, soft  
aluminum .006" x  $\frac{1}{16}$ " diameter, cemented  
to ring of mica from .001" to .005" -  
 $\frac{3}{16}$ " hole &  $\frac{1}{16}$ " diameter.

Characteristics of these were that  
they are not as loud as regular  
mica recorders. They deaden the ring  
of the piano and prevent interference  
making piano accompaniment  
possible.

Make excellent piano records  
as each note can be distinctly  
heard.

Made tests of lenses. Found necessary  
to have stops in the tubes to prevent  
extraneous light & consequent fog.  
Gave tubes to camera to do this.

Made test of wide open & stopped  
down lenses to show that the  
difference in depth of focus.

So far have not been able to  
get any definition out of the  
16" telephoto lens.

Set up screen for Committee. Ran  
K-11 & K-14. Photography on the  
front is good. Recording shows some

interference but does not appear  
nearly so bad with picture as  
without.

Photography in K-16 (Messers. Jones)  
shows badly distributed lighting. The  
background is too bright the foreground  
and particularly the lower portion not  
light enough.

Method of securing uniform lighting  
all over stage

8/14/3.  
Hermes, left ~~later~~ out new records  
#5 5, 20, 30, 40, 60 & 70  
#20-30-60 were little sharp and  
weak.

#5-40-70 were good and full,  
natural and excellent and did not  
show any interference with the  
piano.

Made trial record with these  
and will have blue record made  
for Mr. Edison to hear.

Record #5 208B-212B-214B  
2218C which were Austrian  
records reported as much too  
weak for commercial purposes.

Hermes had amplified these  
and they now appear good and  
loud - excellent as commercial  
records.

Found that #238A Record  
#238B film was sent here. This  
looks like a mis matched pair  
had been sent to Europe.

Amplified Mrs. Murphy's Harlequin  
C15

and made it louder than  
originally. Not particularly good,  
however, probably not commercial

---

8/15/14.

Further tests of aluminum center  
recorders to diminish piano  
interference.

Elimination tests to find which  
recorder is best of the  
following:

- #5 (038" needle) Standard
- #20 (024" needle) Piano not as loud  
Voice little metallic
- #30 (024" needle) Piano louder than #20  
Voice not so loud but more  
natural
- #40 (024" needle) Piano good natural  
Voice excellent.
- #60 (024" needle) Piano good  
Voice more metallic than #20
- #70 (024" needle) Piano good full  
Voice full good

Further tests showed #40 to be the best  
at 70 mch.

8/7/4.

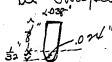
Therms made new tests of Beck  
keton new recorders to determine  
piano interference with new  
recorders.

Arm<sup>st</sup> on piano Played hand face  
in middle register.

Apparently #40 recorder (aluminum  
center) had slightly less interference  
than #10 (Standard). It is evident  
however that other fingers (preferably  
women) and accompanist must  
be obtained as it was practically  
impossible to get interference  
even when tried.

Therms set up another arm with  
new needle & sapphire.

It is evident that for double  
amplifying with 0.24" needles  
the ball in amplifier lens arm  
should be shaped



also that the post-recorders both  
for recording machine and for  
amplifiers should not be less than  
3/4 ft to 3/4 long.



8/18/14.

Hernu set up amplifier with new long needle. This showed very deep and gave considerable trouble. Took all morning to do.

Made records of a baritone singer.

Mr. Hingham came & talked. Showed him new recording & amplifier. He said the latter was good - better than he expected.

Amn. tried several times to set up camera & focus but could not on account of other interference.

3/19/14

Herman made further trials with  
aluminum centered diaphragms to  
accomplish

- ① Naturalness of tone & quality
- ② Diminish interference.

Did not get a recorder better than  
#40 which showed up best  
before.

Made record of Mrs. Belle Pett  
piano with #40; #10 (old standard)  
#40 showed better quality & diminished  
the piano.

#40 was crisp but the piano  
rang in too much and the voice  
was a little sharp. On account  
of ~~old~~ playing of piano,  
neither of them showed any  
interference.

Spent morning trying to get  
#5 reproducing machine up  
to be being used at Studio.  
Did not get this route out. Put  
Hammond on job. He did  
not succeed.

At night worked on printing  
positives from negatives made.  
Can do it but for reliable work  
must make up own developers  
etc. Found that positives must be  
correctly exposed - about 9 sec.  
at 6 ft from bowatnagga lamp.  
That the development must be carried  
farther for positives than for  
negatives to secure density.

8/30/4.

Merrill made new tests and records  
on non-interfering Vender, #40  
showed up best and proved that  
these aluminum centered diaphragms  
are non interfering, no compared  
with regular mica diaphragms.

Made takes with Dallmeyer f1.9 lens.

- ① with microscope focusing. Point  
of focus showed a little behind on  
scale i.e. - for 5 yds showed about  
5 1/2 yds. Pictures taken with this  
showed focus slightly behind principal  
subject.
- ② Taken at f 4-5.6-8 showed that  
f5.6 was nearest correct exposure.
- ③ Stake with pointer just forward  
of 5 yds. gave beautifully clear  
pictures.
- ④ Used same lens wide open -  
& Anstos & side lights. ① Bulb  
eye focus. Showed on background.  
② Setting indicator little ahead.  
Shows focus on foreground.

③ Indicator on Eyd mark. Shows  
better than either of others but  
not perfectly sharp.

8/24/14.

Therms worked on non-interference  
records. Got wave on test  
which proved in working  
machine.

Amik made steel stage take with  
Dallmeyer 75mm lens at  $f4-5.6-8$   
later development proved all  
undisposed.

Made take of chair etc with  
Helios 45-56 6.3. Later development  
proved all undisposed.

This because  
sep film from studio  
Short Ends was  
used. Should use  
fresh film

8/20/11.

Thermer made pearls with #10 & #10  
recorders to show difference in interference

AMK made out of focus bow tubes  
with

① Helms lens @ f 25-18-12.

② Dallmeyer " @ f 16-11-8.

Developed all films in afternoon  
& showed that of ①  
f 17 was nearest correct exposure  
and of ② the correct exposure  
lay between f 8 & f 11, showing that  
f 9.6 would be about right.

These exposure  
values are wrong  
because old film  
was used!

' 8/24/14.

Morris made up new follow  
ball recorder. Made several trials.  
results good. Seems to be louder  
than floating recorder and more  
solid. Has a little more surface.

And made photographs:

1  
Dallmeyer lens. Interior stage  
all lights burning. Lens at 10 yds.

- ① f 4 - overexposed - from trifle back
- ② f 5.6 - about correct exp. " "
- ③ f 8 - trifle underexp. " "

Correct exposure would have been f 6.3.

2  
Dallmeyer lens. Out of window. Bright  
Sun. 11:30 am. Lens at 10

- ① f 5.6. overexposed badly
- ② f 8 " "
- ③ f 11 " "
- ④ f 16. overexposed.



3

Dallmeyer 75 mm lens. Collect on road  
from Eagle Rock to Montebello. 4:48 PM.  
In shadow of trees & hill.

- ① f 5.6 under exposed - focus good
- ② f 8. overexposed " " " "
- ③ f 11. " " " " " "
- ④ f 16. " " " " " "

4

Dallmeyer 75 mm. Sky & distant trees. 5 PM. ∞

- ① f 8 over exposed - focus good.
- ② f 11 " " " "
- ③ f 16 correct " " "
- ④ f 56 slightly under. " "

5

Dallmeyer 75 mm. Open. Sun under cloud -  
green shrubbery background. 7 yd.

- ① f 5.6 good exposure - good focus.
- ② f 4. trifle overexposed - " "

8/25/14.

Merwin worked on fellow back recorder.  
Reel on same with sharp as compared  
with floating weights. Had some  
blinds and bed of pots also.

Amey made the following takes:

Helian lens out window to check  
over exposure of Dallmeyer lens  
of day previous.

- ① f/12 - Red Sun - 10:15 am. Distant out 00
- ② f/18 " " " " " "
- ③ f/25 " " " " " "

- ① Showed excellent exposure
- ② " good "
- ③ " under "

Comparing these with session  
of yesterday, pictures taken at  
same time of day and under same  
conditions with Dallmeyer lens,  
proves that if the exposure of the  
Helian lens is correct, the ratings on

the Dallmeyer lens are much too low  
or that this lens is about 3 or 4 times  
as fast as the Helios.

With 3 Engravers arcs burning.  
Made ex.posure with Hymn meter.  
Shutter 8 seconds, which for f/90 plate  
gives f5/8. Exposed at f4 with  
Kodak plates in following:

- ① Dallmeyer lens to check above -
- ② Test Cooke 6" lens. Focus by eye on  
ground glass. Distance 5 yds. f4.5 used.  
Focus not sharp. Exposure good.
- ③ Test Excess 6" lens. Focus by eye on  
ground glass. Distance 5 yds. f4.5 used.  
Focus, not perfect but best of the lot  
focused this way. Exposure good.
- ④ Test Helios 6" lens. Focus by eye on  
ground glass. Distance 5 yds. f4.5 used.  
Focus not sharp. Exposure good.
- ⑤ Test B & L Zeiss Tessar lens. Focus by  
eye on ground glass. Distance 5 yds. f4.5 used.  
Focus not perfect, better than 2nd. Exposure  
good.
- ⑥ Test Cooke 16" Telephoto. Focused  
by eye on ground glass.

Focus shows not good. Exposure OK.

8/26/4.

Morris worked on follow ball recorder. First results poor. Then ones better. Got him some .004" x .006" sheet aluminum and some follow ball heads.

AMK: experimented with focusing on ground glass and looking at this image with microscope. Also working out the telephoto lens.

1  
Telephoto lens at about 40 ft. Focused on ground glass with microscope. Result poor. Not perfectly sharp. Exposure excellent.

2  
Telephoto lens out of window at junction on Eagle Rock about 1 1/2 miles. Focused on ground glass with microscope. Result fair to good. Exposure excellent.

3  
6" Express Lens. Focused on ground glass with microscope. Focus fair. Apparently on foreground. Exposure poor.

6" Express Lens. Focused by aerial image method. Focus good. Exposure OK.

8/27/4.

Therms checked on follow base  
method of recording. Results good.

And made tests of methods of  
focusing and of use of exposure  
meter. Test shows up excellent.  
All exposures good. Have not  
yet found reliable method of  
focusing other than graduated  
lens.

Set up for Committee meeting.

8/28/41.

Mermer made up new Sallaw  
hall records. Some good  
Some indifferent.

Ans set up #6 camera &  
exposed with regular lighting  
① f4.5 - good to little over exposed.

② f6.3 - good exposure.

③ f9 - Underexposed.

Focus seems to be good.

Also Patraich picture of Robb  
set with 3" Dallmege lens.

① - 14 ft. Red turning head f5.

② - 11" " " f6.3

Sent films to Reulised to develop.

8/27/47.  
all crew off.

AMK made tests of new cheap  
tels.

3 tapes at f 4, 5.6-8 showed  
the best for this class of work  
give sharp contrast & not  
half tones are what is desired

Set taken for Reubens to Deulop  
& New Chas Edition.

Experiment on electrolysis of  
fuming solution.



**Notebook Series -- Notebooks by Experimenters Other Than Edison  
Kinetophone and Kinetoscope Experiments -- Miscellaneous Books  
[not selected]**

These seven books were used by William W. Dinwiddie, Harry W. Doyle, Zachariah P. Halpin, and James W. Ramsay during 1911-1914. Included are experiments to ascertain the best carbon element for the "motion picture machine." There are also tests to determine the optimum relative positions of the kinetoscope and phonograph for synchronization. Some entries describe tests of the home projecting kinetoscope, including lighting, safety, and parts. There are also tests of various screens and films, as well as experiments with film developing machinery and formulas. One book (N-14-01-27.2) contains drawings of parts for a motion picture camera. The notes indicate that Adolph F. Gall, Charles W. Luhr, J. O. Lyman, Elroy Pearsall, and an employee named Rowlands were doing similar work.

N-Number

Labels and Inscriptions on Front Cover

**Books Not Selected**

11-08-31	---
12-10-02.2	"Dinwiddie Ramsay Developing etc. Silver Plating. Celluloid."; "Disc Records"
13-01-28	---
13-03-15	"Automatic Film Developing Machine. W. W. Dinwiddie. March 15, 1913. S.O. 3300"
14-01-09	"Miscellaneous Tests"
14-01-27.1	"Drying Machine"
14-01-27.2	"Experimental Recording. HW Doyle"

**Notebook Series -- Notebooks by Experimenters Other Than Edison  
Group 3: Navy and Wartime Research Experiments (1917-1919)**

These thirty-one notebooks were used during the period 1917-1919 for experimental work for the U.S. Navy and other wartime research. The experimenters whose research is documented in these books include Jerry T. Chesler, Charles T. Dally, E. Rowland Dawson, William Deans, John A. Hanley, Newman H. Holland, William A. Hayes, Absalom M. Kennedy, Paul D. Payne, Edwin Smith, Jr., and Selden G. Warner. Many of the books contain entries pertaining to submarine and torpedo detection. Also included are experiments on smoke generation to hide ships, the prevention of rust on submarine guns, and improvements to range finders and spotting telescopes. In addition, there are notes on a respirator to protect men in the fighting tops of battleships from sulphur dioxide fumes, a smoke bomb, a kite for bomb delivery, a primary battery for airplane use, a "stabilized plane for running light," and a "wheel" weapon for trench warfare. Much of this work was carried out under Edison's instructions and supervision. Some of the tests took place at sea near Sandy Hook and Red Bank, New Jersey. Sixteen books with indications of oversight or involvement by Edison have been selected. Related material can be found in the Naval Consulting Board and Related Wartime Research Papers, Special Collections Series.

The notebooks are arranged in five subgroups:

1. A. M. Kennedy Books, Nos. 1-7 (7 notebooks)
2. J. A. Hanley Books, Nos. 1-2 (2 notebooks)
3. Submarine Detection Books (4 notebooks)
4. Miscellaneous Books (13 notebooks)
5. S. G. Warner Books (5 notebooks) [not selected]

**Notebook Series -- Notebooks by Experimenters Other Than Edison  
Navy and Wartime Research Experiments  
A. M. Kennedy Books, Nos. 1-7**

These seven notebooks were used by Absalom M. Kennedy during March-November 1917 for notes on experiments with submarine and torpedo detection, underwater acoustics, transmitters, receivers, amplifiers, audion circuits, and submarine illumination. Several books include notations by Edison as well as Kennedy's remarks about Edison's opinions and suggestions. The notes indicate that James M. Burns, Jerry T. Chesler, E. Rowland Dawson, John A. Hanley, Joe Melner, and Sherwood T. (Sam) Moore also worked on experiments with Kennedy. Some of the tests took place at sea near Sandy Hook and Red Bank, New Jersey. Related notes by Kennedy can be found in the Naval Consulting Board and Related Wartime Research Papers, Special Collections Series.

<u>Book #</u>	<u>N-Number</u>	<u>Labels and Inscriptions on Front Cover</u>
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**Selected Books**

[1]	Undated.6	"Description of Transmitters and Receivers. (Kennedy)"
2	17-03-06	"Experiments. #2 March 6 - March 20"
3	17-04-05	"Experiments #3 March 21-"
4	17-04-01	"Experiments. #4 from May 1 to 1917"
5	17-08-27	"Experiments #5. From 8/27/17 to 10/9/17"
6	17-10-04.1	"Experiments #6 From Oct. 4 to Nov. 2, 1917"

**Books Not Selected**

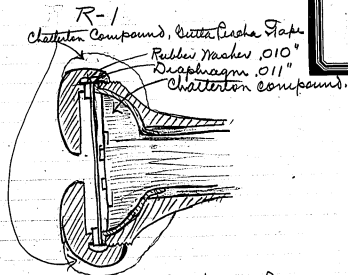
7	17-11-02	"Experiments #7 From Nov. 2, to 1917"
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**Notebook Series -- Notebooks by Experimenters Other Than Edison  
Navy and Wartime Research Experiments -- A. M. Kennedy Books  
Notebook, N-Undated.6**

This undated notebook was used by Absalom M. Kennedy and another experimenter in March 1917 for notes on work for the U.S. Navy performed under the direction of Edison during World War I. At the beginning of the book are entries by an unidentified experimenter probably relating to submarine illumination. The notes and drawings by Kennedy pertain to three experimental transmitters and three experimental receivers. The front cover is labeled "Description of Transmitters and Receivers (Kennedy)." The pages are unnumbered; 17 pages have been used. Only the entries by Kennedy have been selected.

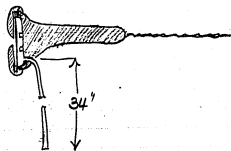
## Receivers

R-1



Regular Bell Receiver. Interior  
 filled with Chatterton Compound.  
Diaphragm - Regular Bell,  
 .011" x 2 3/16" .015" from magnets  
Rubber gasket .010" thick between  
 cap shoulder and diaphragm.  
 Joint between cap and body  
 covered with Chatterton  
 Compound and wrapped with  
 Gutta Serena and Tape to  
 prevent leakage.

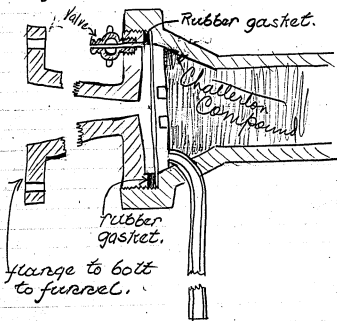
R-2



Same as R-1 but with brass  
tube  $\frac{1}{4}$ " diameter, 34" long  
connecting inner air chamber  
to equalize pressure.

R-3.

Brass Receiver for use with  
funnel.



Electrical and Magnetic construction  
Same as #1.

Valve as shown to draw all air  
from outer chamber.

Pipe as shown to equalize  
pressure by compressing air in  
inner chamber.

Transmitters

1

Large Blue

Pulse Eb

240 instructions per second



#2

Small Bell

Pitch B

488 vibrations per second.

#3.

Break wheel and reeview.

Break wheel turned by  
hand. Has 92 teeth.

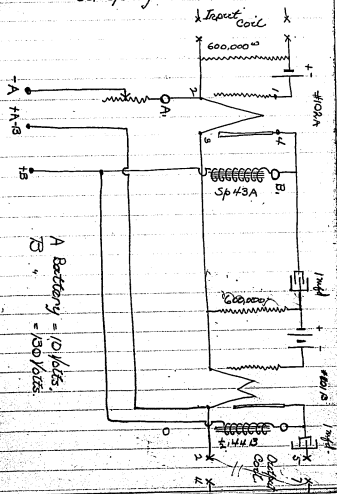
Reeview, from Stromberg-Carlson  
Idea. Set, Match Case type -  
.010" diaphragm.

Use as standard 2 cells M8  
Storage battery.

**Notebook Series -- Notebooks by Experimenters Other Than Edison  
Navy and Wartime Research Experiments -- A. M. Kennedy Books  
Notebook, N-17-03-06**

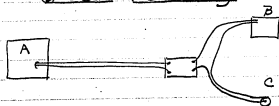
This notebook was used by Absalom M. Kennedy in March 1917 for notes on experimental work for the U.S. Navy performed under the direction of Edison during World War I. The book, which has been used in both directions, consists primarily of notes on experiments involving amplifiers, audion circuits, transmitters, and transmitter parts. At the other end are a few pages containing descriptions and drawings of transmitters, numbered E1-E6 and E31. Several entries include notations by Edison or remarks by Kennedy about his opinions and suggestions. The notes indicate that E. Rowland Dawson and Joe Meilner also worked on these experiments. Two items, including a note in Edison's hand, have been inserted into the book. The front cover is labeled "Experiments. #2 March 6 - March 20." The pages are unnumbered. Approximately 110 pages have been used.

# W.E. Co. Corrections for special amplifier.



A Battery =  $100\mu$   
B " =  $100\mu$

# Tests of Amplifier with break running.



A closed. No phone on.  
B " Has person on  
C running

①  
Straight circuit as above.  
Chirups

②  
Connected Reluctivity ground.  
Stops Chirups. Ideal Brake wheel 57

③  
1 mfd condenser across 2-7 of  
output coil.  
Stops Chirups. Break wheel loud.  
Sudden break at x 50

④  
Condenser across 2-4  
Chirups

⑤

Condenser across 4-5  
Continuous loud noise.

⑥

Condenser across 4-7  
Continuous loud noise.

⑦

Condenser across 5-7  
Chirups - slow

⑧

Condenser across 2-5  
Chirruping stopped. Noise very slight. 30

⑨

3500<sup>ws</sup> across 2-7  
Chirruping stopped. Loud noise 60

⑩

3500<sup>ws</sup> across 2-6  
Chirups.

⑪

3500<sup>ws</sup> across 2-5  
Loud noise

⑫

3500<sup>ws</sup> across 4-5  
Chirups.

⑬

Chirruping stopped. Loud noise.

3500<sup>00</sup> across 5-7. - Chirrup. (14)

Since (8) was good compare with it. ✓ (1)

1 mfd condenser across 2-5  
no chirrup. Slight noise 30

2 mfd across 2-5 (2)  
Ver. slight noise but  
intermittent, slowly, louder 20

6 mfd across 2-5 (3)  
Cuts out almost all noise but  
slight intermittent 8

~~Then connected transformer  
#9 across circuit between  
audions.~~

~~Chirruping stopped~~

Then put #7 coil in place of  
#9. High to audion, low to  
resistor.

Regular circuit ①  
Chirrup

Using Richomitz ground ②  
Stops chirrup.

56

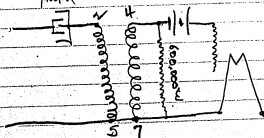
1 mfd condenser across 2-7.  
Stops chirrup. Some noise. ③

60

1 mfd condenser across 2-5  
Stops chirruping, no noise. ④

22

Then put repeating  
Coil #9 between audions  
mid





⑤  
With #9 repeating coil as before  
stops chattering but the  
break noise is very prominent

Then put ⑥ on Ruhovitz ground  
Large part of the break noise is  
cut off measures 50

Removed ground and put  
1 mfd condenser around 2-7  
of output coil  
Break noise less 30

⑧  
Then reversed connections  
4 and 7. No ground or condenser.  
Noise very like ⑤

⑨  
Then put on Ruhovitz ground.  
Still noisy.

⑩  
1 mfd condenser 4-7.  
Noise much reduced 30

⑪  
Removed condenser. Noise. Then  
connected neutral points of the  
primary & secondary of out put

coil together. Some noise

(12)  
Then connected up as in 7.  
(mpf condenser across 2-7), and  
started the vibrating spring with  
magneto connected in A circuit.  
Can hear the oscillations  
but they are very faint, not  
as good as without the  
audion.

Tests for amplification,  
break rot turning.



Phonograph

A - receiver, 4' from phone in box.  
B - receiver, head in booth.

(1)  
Straight circuit as (5) - with  
repeating coil between audions  
out but secondary ground in  
Heavily

②  
1 mfd condenser connected  
from 2-7 of output coil  
Hear at 60

③  
Repeating coil between  
audions as in ⑤.  
now get high pitched  
whistle.

④  
Combining ② & ③  
Hear at 60.

⑤  
Repeating ② with 2 mfd  
condenser 60

These run to 60, the end of  
the scale.

Set Phonograph 6' from  
transmitter.

X ⑥ X  
High 1 mfd condenser 2-7  
Hear at 50

X ⑦ X  
1/10 mfd condenser at  
(more noise) 46

③  
~~With 2 mfd condensers  
hear at  
(sharpness not so loud)~~

52

These run to 60 - end of scale  
20 mfd phonograph & from  
transmitter to reduce figure.

⑥  
With 1 mfd 2-7, output coil 60

Moved receiver to 8' from  
phonograph

Still hear at 60

Put Miners Lamp Case &  
battery in front of transmitter  
at 8' (Phone group) 54

⑦  
Used 10 mfd. condensers 54

⑧  
Used 7 mfd condensers 54

⑨  
Used 6 mfd condensers 53

Mr. Edison said that the trouble was really leakage in the output coils.

Had 2 Bunnett coils used in place of W.E.

These cut out the chirruping and a great deal of the dynamo noise. Showed 36 where W.E. showed 50.

Sped these on break wheel. Very loud noise.

Then grounded both sides of primary thru about 300 resistance. Just as loud.

Both sides of secondary through same resistance. no difference.

Both sides of primary through 2 mfd. condensers. no sound.

Mr. E. then states that trouble was in the insulation between primary and secondary coils and that the a.c. was leaking from the one to the other and that new coils

would have to be tried,

### Experiments on Amplifier

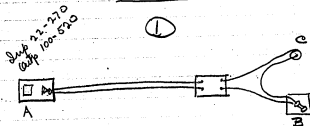
- ① Connected 2 mfd. condensers around break.  
Killed noise of break entirely.
- ② Started up vibrator on septem.  
Could not hear vibrator.
- ③ Cut input coil out and connected direct to amplifiers.  
No better results.
- ④ Used telephone receiver as transmitter.  
Most perfect telephone conversation I ever heard through the break.
- ⑤ Then cut off the break.  
No change in conversation.
- ⑥ Then took out pet coil out so as to talk directly thru amplifiers.  
Conversation a little weaker.
- ⑦ Then connected vibrator in this circuit.

- Could not detect vibrations
- ⑧ Then connected break in primary circuits.  
Could not hear.
- ⑨ Then put 10 mfd. condenser in shunt with break.  
Can hear break and little of vibrations
- ⑩ Then connected the break so that it was back in the primary circuits. No better.
- ⑪ Then connected in Bunnell coils as input & output. All singing & chirruping stopped.

After a number of trials with and without break, found that the trouble we have been experiencing was because of a super sensitive input coil - not trouble with output and that when this coil was removed, dynamo noises singing & chirruping etc. were also removed, though the amplification may not be as loud.

3/7/17.

Reconnected 1192 (Large Input) coil  
so as to give 2165 - 4387 connections.  
On connecting up, this gave a  
very high, pitched note with  
telephone in circuit at A.



A - closed, phone on line  
B - closed  
C - running.

Input Coil P22-5270 Bunneel  
Primary to A - secondary to audion  
Output Coil P100-5520 Bunneel  
Primary to B - secondary to audion

Breaker voices loud  
Still hear at

60-  
60  
64



②  
Stopped C on contact. Phone  
running at in box. Transmitter  
8' from box behind miners lamp  
case & battery.  
Tear at  
Line angularly noiseless 42

③  
Put  $1/10$  mfd condensers around  
break  
Break noise very slight.  
Cut out at 24

④  
Put 1 mfd condensers around  
break.  
Very little noise from break  
Cut out at 20

⑤  
Mr. Edison took cloth insulation  
around primary of output coil.  
I removed cloth around input  
coil. With no condensers around  
break.  
Nearly all noise removed - cut out at 24.

⑥  
Input coil then covered with original cloth.

Noise louder. Cuts out at 56

⑦  
Then cut out the telephone and short circuited A.

Noise practically cut out.

Input coil has cloth —  
output coil cloth off acc insulation

⑧  
Put resistor on A. Phonograph in box, resistor 8 ft distant and behind miners lamp battery.

Stopped break on contact.

Box reading 42

⑨  
Then took cloth off input coil, testing as in ⑧

Box reading 42.

⑩  
Replaced input coil (Bumbee) with N. E. M. 192. Short circuited line at A.

Not chattering.

Then put on Lebowitz ground.  
Chirruping stopped.

Resistance of Coils used.

Input N.E. MIGR { Primary <sup>1.30V</sup> 1.30 ohms.  
Secondary 1760, "  
1758 "

Burrell Coils.

Primaries:

- ① + 11 ohms
- ② 22 " ✓ not 101
- ③ + 100 "
- ④ 260 "

Secondaries:

- ① 130 ohms
- ② 270 "
- ③ + 520 "
- ④ 1000 " N1
- ⑤ x 2800 "

130  
270  
520  
1000  
2800

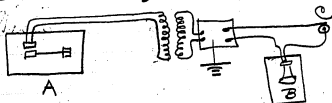
(12)  
Connected Bunnell coil  
11-2800 in circuit as  
of input coil. Break  
running. A closed.  
Chirrup's badly.

(13)  
Then put on Relativity ground.  
Chirrup disappears.  
Slight brake noise cut out at 16

(14)  
Stopped Break on contact  
connected transmitter at A  
& started phonograph  
Heav to 48.

9/7/17 - night

# Detection of Vibrator.



Tests made by connecting magnet of vibrator to line at A. This goes to 11-2800 Bunnell coil and to audion board. Through 520-100 Bunnell coil to break C (running) in series with piece of B. Had Dawson start vibrator & count for 15 seconds. I must repeat count to insure correctness. Bellows ground on.

Small Vibrator - Fast,  
Can not hear at all

(2)

Cut out Bunnell coil 11-2800 connecting A direct to audion. Hear slightly but could not count.

③  
To make sure circuit was  
complete, put transmitter on  
A and had Dawson talk.  
Could hear him, jumbled of  
course through break.

④  
Took off Reichenitz ground,  
leaving evaluator direct  
to Dawson board.  
Circuit noiseless.  
Can not hear anything.

⑤  
Put Binnell coil 11-2800  
back in circuit, - no ground -  
can hear break.  
I got 65 Dawson 58 just time  
" " 59 " 57 second "  
" " 56 " 60 third "  
This is the first time I have  
been able to detect.

⑥  
Then connected  $1/10$  mfd  
condensers around break.

Noise of break wheel much  
reduced

1st trial	Dawson	53	Kennedy	54
2nd "	"	54	"	53
3rd "	"	55	"	57

For these, I really hear only  
the 1st 12 or 15 beats and  
continue the count on  
the rest to 15 sec.

⑦  
Then had Dawson make  
the evaluator slower, so that  
I could not remember the  
speed of beats.

1st trial	Dawson	36	-	Kennedy	41
2nd "	"	37	-	"	38
3rd "	"	38	-	"	37

I do not believe however  
that a person without  
a keen sense of metrical  
rhythm would be able  
to do this.

⑧

Dawson then moved the magnet back so that it was close to the spring rather than the weight of the vibrator.

①	Dawson	38 - Kennedy	40
②	"	32	" 36
③	"	32	" 31
④	"	34	" 35

x speed changed here.

In all of the above the spring hit or touched the magnet faces so as to give a distinct sound.

Then tried to vibrate so that the spring would not hit the magnet, I was not able to count such because I could not get the rhythm of the first beats.



⑦  
Then connected through  
direct from A to B & C  
without amplifier, 1/10 mfd  
condenser still on break

① Dawson	31-	Kennedy	31.
② "	31-	"	33.
③ "	31-	"	31.

Dawson moved weight.

① Dawson 42-Kennedy 43.

Dawson moved weight

① Dawson 28-Kennedy 28.

Dawson moved weight

① Dawson 35-Kennedy 36.

In no case above did the  
spring touch the magnets. I  
can hear each beat perfectly  
so that this is much more  
sensitive than with the  
audion.

⑩  
Then removed condensers  
from break wheel.  
① Kennedy 44 - Dawson 39 -  
② " 44 - " 41 -  
③ " 37 - " 37 -

While I got the above, I  
made some false takes and  
could not hear as well as  
before.

⑪  
Then put 7 mfd. condensers around  
break.  
① Dawson 34 - Kennedy 36  
② " 46 - " 46  
③ " 39 - " 39

Reduced amplitude  
① Dawson 32 - Kennedy 37  
② " 46 - " 46  
③ " 40 - " 43

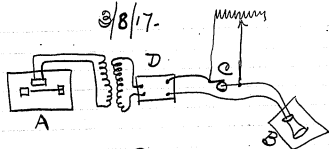
Results not as reliable as at  
110 mfd.

1/10. nfd condenser. at break  
 as standard.  
 1. changed to large radiator.  
 ① Dawson 45 - Kennedy 46  
 ② " 45 - " 45  
 ③ " 47 - " 47  
 ④ " 52 - " 52

then connected in circuit  
 with Runcel coil 11-2800  
 and audion. no ground  
 Dawson 43 - Kennedy 43  
 " 49 - " 48  
 " 48 - " 48  
 " 54 - " 51  
 " 52 - " 52

Vibrations

3/8/17.



①

Used Range vibrator at A,  
audion with 11-2800 Bunnell  
coil at D -  
C stopped on contact  
B closed.

Experiment to see if we could  
hear A with C not running.

Can not hear when vibrator  
works normally. Can hear  
when the spring touches the  
magnet.

②

Then started C, shunting  
with various resistances to  
keep down noise -

① Infinite Resistance. Can hear  
only when spring touches magnet.

- ② 1000 ohms around C.  
Still hear break. Can not  
hear the vibrator.
- ③ 500 ohms around C.  
Still hear break. More musical  
sound. Can not hear vibrator.
- ④ 200 ohms around C.  
Still hear break, loud as ever.  
Can not hear vibrator.
- ⑤ 100 ohms around C.  
Still hear break as loud as ever.  
Can not hear vibrator.
- ⑥ 50 ohms around break.  
Get dynamo noise much more  
prominent. Break noise still.  
Can not hear vibrator.
- ⑦ 20 ohms around C.  
Get dynamo noise & break  
Can not hear vibrator.
- ⑧ 10 ohms around C.  
Dynamo and break noise  
Can not hear vibrator.
- ⑨ 4 ohms around C.  
Dynamo and break noise  
Can not hear vibrator.
- ⑩ Stopped break wheel.  
Hear dynamo noise.

- ✓
- ⑩ 2 ohms around C.  
Dynamo noise, Break noise  
very slight.  
Can not hear valuator.
- ⑪ 1 ohm around C.  
Dynamo noise. Break noise  
slight.  
Can not hear valuator.
- ⑫ Short circuit C.  
Dynamo noise, Very slight  
break noise.  
Can not hear valuator.

### Test of Row Box for transmitter.

Mr. Edison had box 8' long  
12' x 12" section made to keep  
external sounds out of  
transmitter which is enclosed  
in another box 6" x 6" x 8"  
with hole in front opposite  
diaphragm.

With diaphragm on this  
open hear to 48

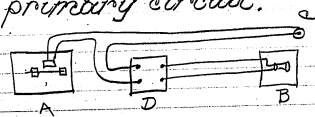
# Test of Diaphragm of Transmitter Box.

Wide open (transmitting)  
3/4 " " "  
1/2 " "  
1/4 " "  
Closed

44  
44  
44  
44  
44

This means that the small box  
must be made more nearly  
sound tight.

## Test of Vibrator in primary circuit.



- A = Vibrator connected
- B = Closed
- C = Running
- D = With 11-2800 Bunzel coil  
as input and 520-100 Bunzel

coil as output.

①  
Valuator moving very slightly.  
Magnets  $\frac{3}{16}$ " from Reed.  
Dawson 31 - Kennedy 31 Valuations  
" 36 - " 35 "  
" 40 - " 40 "

②  
 $\frac{1}{10}$  mfd condensers around break.  
Dawson 38 - Kennedy 37 - Valuations  
" 30 - " 32 "  
" 31 - " 32 "

(Magnets  $\frac{9}{16}$ " from Reed)

③  
Magnets  $\frac{1}{4}$ " from reed.  
Dawson 29 - Kennedy 30 valuations

④  
Magnets  $\frac{5}{8}$ " from reed.  
Dawson 30 - Kennedy 31 valuations

⑤  
Magnets  $\frac{1}{2}$ " from reed.  
Dawson 30 - Kennedy 29 valuations

⑥  
Magnets  $\frac{1}{2}$ " from reed.  
Dawson 34 - Kennedy 33 valuations



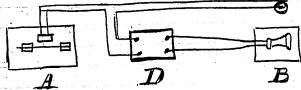
60/9420  
157

60/11100  
185

(7)

Mr. Dawson then directed to try  
and hear fan blades going  
slowly.  
Could not hear this.

Test of Break Wheel  
at various speeds.



A closed, vibrating  $\frac{1}{2}$ " from magnets  
B " with receiver.  
C running at following  
speeds in breaks per second.

C = 157 breaks per second  
Dawson 29 Kennedy 31 vibrations  
Can just hear.

(2)  
C = 185 breaks per second.  
Dawson 31 Kennedy 30 vibrations  
Can just hear. no improvement

$$62 \overline{) 17472}$$

$$6 \overline{) 452}$$

③  
C = 708 breaks per second  
Dawson 37 - Kennedy 32 valuations  
No improvement

④  
C = 247 breaks per second  
Dawson 31 - Kennedy 33 valuations  
No improvement.  
Break jumps and is irregular  
at this speed.

⑤  
Then adjusted spring of break  
so as not to jump so much  
C = 247 breaks per second.  
Dawson 32 - Kennedy 32 valuations

⑥  
Then adjusted spring a little  
tighter. Same clear  
C = 247 breaks per second  
Dawson 31 - Kennedy 31 valuations

Experiments at lower  
speed.

⑦  
C = 150 valuations per second.  
Dawson 35 - Kennedy 35 valuations

$$\begin{array}{r} 6780 \\ 130 \end{array}$$

$$\begin{array}{r} 92 \\ 78 \\ \hline 1400 \end{array}$$

$$\begin{array}{r} 6780 \\ 130 \end{array}$$

⑧

C = 130 valuations per second.  
Dawson 34 - Kennedy 36 valuations.  
Think I hear better at this speed.

⑨

C = 90 valuations per second.  
Dawson 34 - Kennedy 35 valuations.  
Then tried valuating at lower  
amplitude -  
Dawson 34 - Kennedy 35 valuations.  
Seems better at this speed.

⑩

C = 55 valuations per second.  
Dawson 33 - Kennedy 30 valuations.  
Not so good. Could not get  
lower amplitude.

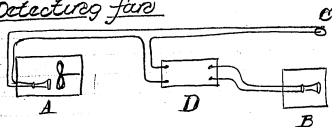
⑪

C = 33 valuations per second.  
Dawson 35 - Kennedy 35 valuations.  
Tried lower amplitude.  
Dawson 34 - Kennedy 35  
but not very plain.

$$\begin{array}{r}
 392 \\
 \underline{784} \quad 3 \\
 4 \\
 60 \overline{) 3136} \\
 \underline{57}
 \end{array}$$

3/9/17.

# Detecting fan



- A = closed, with transmitter.
- B = receiver.
- C = running, normal speed 150 blades per minute.
- D = with Bunell 11-2800, 520-100 coils.

(1)  
Lowest speed at which I could detect fan running was 784 r.p.m.  
As there are 2 blades to fan, this means 3136 impulses per minute or 52 per second.

I do not believe this speed is necessary because of the number of impulses per second but because it requires this speed to produce breeze enough to hear.

Test of Calibrating Box.  
and of new coil.



(14)  
Magnet  $5\frac{1}{8}$ " from spring  
Dawson 47 - Kennedy 47 - evaluation  
Not very loud but clear.

(15)  
Magnet  $3\frac{1}{4}$ " from spring  
Dawson 41 - Kennedy 47 - evaluation  
Still clear.

(16)  
Magnet  $7\frac{1}{8}$ " from spring.  
Dawson 47 - Kennedy 43 - evaluation  
Hard to get & distinguish.

(17)  
Magnet 1" from spring  
Can not distinguish.

(18)  
Then moved magnet opposite  
weight to see if this would be  
more efficient.

Magnet 1" from weight.  
Dawson 47 - Kennedy 47 - evaluation  
Loud and clear here.

(19)  
Magnet 14" from weight.  
Dawson 40 - Kennedy 40 - evaluation  
Loud & clear.

## Deduction

The limit of hearing comes suddenly.

Space between poles of magnet =  $\frac{3}{8}$ ".



At ordinary distances some of the lines can reach the vibrating weight.



At greater distance however they have no tendency to jump the double air space.

Magnet  $1\frac{1}{8}$ " from weight.  
Dawson 42 - Kennedy 43 vibrations  
still clear.

Magnet  $1\frac{3}{8}$ " from weight.  
Dawson 41 - Kennedy 40 vibrations  
Very faint; Do not believe I can hear further.

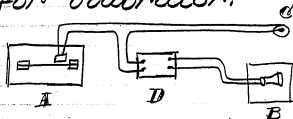
Magnet  $1\frac{1}{2}$ " from weight.  
Can not distinguish.



$$\frac{62 \times 64}{21}$$

$$\frac{676}{188}$$

# Experiment to find most efficient speed for vibrator.



A = closed with magnet  $\frac{7}{8}$ " from spring  
of vibrator.

B = closed with receiver.

C = running at about 90 breaks  
per second.

D = used with Bunnell 11-2800, 520-10  
coils.

Large Vibrator used.

(1)

With weight at end of negd.

Dawson 47 - Kennedy 41 - Vibrations

(8/3) (2/3)  
Very faint. Can just hear.

(2)

Weight moved  $4\frac{3}{8}$ " from end

Dawson 47 (3) Kennedy 47 - Vibrations

Seems triple burden.

6/100  
3.7

6/100  
3.7

6/220  
3.7

6/217  
3.5

Suggest for sensitiveness

Carbon contact between the weight and reed so as to vary contact & current as the weight swings.



spring (reed)  
hard rubber.  
Carbon.  
Weight.

Weight  $7\frac{1}{4}$ " from end.  
Dawson 48 (3.7) Kennedy 47  
Seem to hear a little better.  
(11)

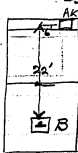
Weight  $10\frac{1}{2}$ " from end.  
Dawson 53 (3.5) Kennedy 53  
Seem to hear better.  
(12)

Weight  $13\frac{1}{4}$ " from end.  
Dawson 57 (3.5) Kennedy 55.  
Hear fairly.  
(13)

Can not get weight off  
as the spring will not vibrate  
for 10 seconds.  
(14)

9/9/17

## Test of EI Transmitters



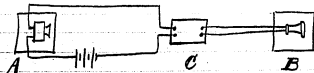
Distance & conditions

A = Phonograph in box  
with  $\frac{3}{4}$ " hole  
W. E. Cumling Reed  
#1 used.

B = Microphone, mounted  
on 2 lead blocks

with cord hair between.  
Door between rooms closed.

## Wiring Diagram.



A = transmitter, with 3 cells battery  
B = receiver & boxes.

C = Audion using Bunuel  
coils 11-2800-1 260-100 coils,  
as input & output

(1)

Set up and tested out. Could hear with door open. Could not hear with door closed.

(2)

Tapped & shook transmitter. Able to hear with door closed at times as far as 30 on bar.

(3)

Shook transmitter again and changed primary of input coil from 11 to 280.

Could not hear at all after considerable search found that transmitter was fitted in at  $90^\circ$  from correct position so that balls did not touch. On turning could just hear with door closed but transmission rough & coarse.

(4)

Replaced 11 primary tried tuning transmitter by "squealing" with receiver.

Somewhat more sensitive can hear at 12 but coarse.

### Deductions -

- ① It is evident that tuning the transmitter improves it wonderfully.
- ② That a high ratio of turns is needed in the input coil rather than a greater number of turns on primary but with less ratio.

⑤ Disassembled transmitter. Found diaphragm in good shape, every ball in place.

Set up. Could not hear with door closed.

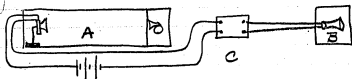
⑥ Tuned again by squealing with receiver. 11 primary used.

Worked fine. Heard to 60 with doors closed.

⑦ Changed input coil to 280 primary. Could not hear as well as with 11 coil. Only  $\times 38$ .

9/10/17.

### Test of E-3 Transmitter



A = E-3 microphone in long box, 7'-3"  
from phonograph in box with  
4 1/2" hole. 3 cells battery used.

B = Closed with pecu new & boxes.

C = audion Bunnell 11-2800; 260-100 cells

(1)

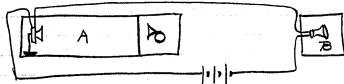
E-3 at 0°  
Could hear to 60

(2)

E-3 at 15°  
Could hear to 60.

Mr. Edison consented to  
make preliminary test  
without amplifier.

# Test of E-3 Transmitter



A = E-3 microphone in long box  
7'-3" from phonograph in box  
with 3/4" hole. 3 cells battery

B = <sup>used</sup> closed. Reconnects boxes

E-3 at 0°

11 at 5°

4 at 10°

4 at 15°

4 at 20°

4 at 25°

4 at 30°

4 at 35°

4 at 40°

4 at 45°

4 at 60°

11 at 90°

(1)

Transmitter quiet  
natural

coming going  
down up

40 32

46 26

46 46

46 40

50 40

52 54

54 54

50 50

50 48

52 50

52 50

52 52

52 52

↑

Measuring Substrance  
Capacity

E-4 receiver is bad in  
design in that



Diaphragm

- ① Receiver to be activated by  
attaching carbon to diaphragm  
by means of nut.
- ② This carbon is liable to  
wobble because of this  
support
- ③ Liable to touch back carbon  
because of brass clamping  
ring.

## Test of E-4 Transmitter

Under same conditions as E-3  
down up

E-4 at 0°

" " 10°  
" " 20°  
" " 25°  
" " 30°  
" " 35°  
" " 40°  
" " 45°  
" " 60°  
" " 90°

Transmitter quality  
fair, below, metallic  
unnatural

38	42
32	40
42	40
36	36
34	32
32	24
34	26
24	38
24	38
28	34
28	26
20	30



3/0/17

Test of E-3 against E-1.

✓ Set up E-1 as last night  
With door closed can hear to 38

E-3 with door open hear to 18

3/11/17

Test of E-4 against E-1

Set up E-1 as last night. With  
door closed can hear to 52

E-4, inclined 15° door open hear to 40

" " 15° " closed " " 18  
Quality short. Not as good as E-1

Test of E-11 with only 12  
rows of poles loaded  
with balls.

Door open hear to 36  
Door closed hear to 14

Mr. Edison states this should be more  
sensitive than above & trouble is with  
the balls.

Found that the balls packed  
in the holes due to

- ① Out of round
- ② Broken balls & chips.

Mr. E. had Melner make  
gauge to check only  
balls of proper diameter.

Previous rolling on glass  
should have eliminated the  
out of rounds.

Mr. Edison had Melner make  
up gauge for balls.

Test of E-4 with tested balls

Test of E-5 against E-1

E-1 can hear to, down closed 58  
E-5.

at times can hear clearly  
to 60 then falls off to nothing  
very irregular. Submerged  
by humming but does not hear.

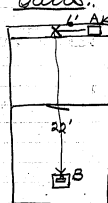
Could only hear by closing  
the opposite opening. With  
both open could not hear  
anything.

On opening up, found only one row of blades in place and this one packed.

This is an awful transmitter to assemble. The diaphragm is not fixed but loose between the two back electrodes. The adjustment will be 99% guess, if possible at all.

---

## Tests of Transmitters filled with selected balls.

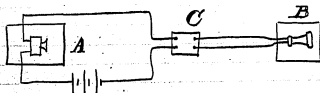


Distance and  
conditions

A = phonograph in box  
with  $2\frac{1}{2}$ " hole. The  
coupling record  
#1 used.

B = microphone  
mounted on 2 lead  
blocks, with  
cushion between.

## Wiring Diagram.



A = transmitter with 3 cells battery  
B = receiver and boxes  
C = Audion using Bunuel coils  
11-2500 input 250-100 output

① Transmitter E-1.

Door open hear to  
Door closed " "

60  
54

② Transmitter E-3 inclined 15°

(Could not get it to equal with receiver)  
Quality not as good when Dawson talks and  
Readjusted so as to equal with  
receiver.

Could not hear with door open  
loaded - 12 rows.

③ Transmitter E-4 inclined 15°

Door open to  
Door closed to

28  
5

Very noisy. Grrp & rimp.

④ Special Magnetic Transmitter E-6

at 5' from phonographs.

Can hear to  
Standard Bee Receiver

8.  
46

⑤ Transmitter E-4 as in ③

But with rubber on each  
side of diaphragms.  
Door open hear at  
Door closed " "

30  
6

⑥ Same as ⑤ except that  
only 3 balls in each of  
12 holes.  
Door open hear to 22

3/13/17

Test of E-4 receiver with  
"002" piece in place of  
copper diaphragm. 15°

1 Remounted E-1

With door open could hear  
only to 22

Readjusted by singing -

With door open can hear to 60

With door closed " " " 44

Then tuned up E-4 so that it  
rings.

So noisy that I can not hear  
them inclined to 30°.

With door open hear to 60

With door closed, so noisy  
I can not hear phonograph  
but can hear General's typewriter  
easily.

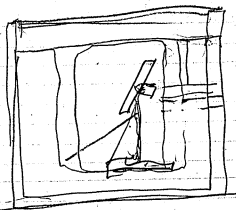
Then changed E-4 to 450  
above noise can just pick up  
phonograph at 12

### Comparisons of Noise -

Laboratory	100%
Eagle Rock Casino, Back Room	60%
" " " Front "	40%
" " " Dulworth Hall	20%
Cellar, "Hulohson's House	10%
Columbia St. Studio	25%
Cellar, Mt. Pleasant Ave	3%
Cellar, Mr. Edison's (Brew)	8%

Test of E-4 with rubber  
stopper vs opening.

Putting rubber stopper in  
opening of E-4 diminishes  
noise slightly but does not  
remove. Reduces not  
more than 20%.



### Distance I can hear watch.

In Laboratory (day)	about	30"
Columbus St. Dublin, Reception Rm		63"
" " " Reception Rm		72"
" " " Book		90"

### Test of E-4 Transmitter in padded box

Transmitter fueled at 150  
Put in box padded with  
cow hair. Rubbed stopper  
in opening.

Cars still hear steady  
noise. This is continuous  
and with but little variation.  
Is non-periodic and does  
not contain high pitched  
notes noticed this morning.

Can not hear phonograph  
then took rubber stopper  
out.

Noise practically the same  
as with stopper in.



With door open can hear 33  
With door closed 30

Dawson then padded around  
transmitter to prevent any  
vibration on stand. Also added  
weights on base. Cowhairs  
wound around transmitter to  
stop any vibration.  
No stopper in opening.  
Still getting steady.

Door Open, Hear to 60  
Door Closed " " 34

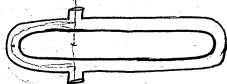
Then had stopper put in opening  
this caused considerable tapping,  
tapping and some musical notes  
which died away. Noise  
same or worse.  
Can not hear phonograph.

With microphone in box and  
opening closed with stopper,  
on packing several inches from  
the box opening, the voice is  
reproduced very loud in back.

This proves that the microphone  
is very, very sensitive, so much  
so that it must be well insulated  
and closed off from vibration  
and sound to be able to reproduce  
at all.

---

# Test of Interference Tube.



Length ~~short path~~  
Outside 3', Inside 2'-6", Mean 2'-9"

~~Long path~~  
Outside 5'-6", Inside 5'-0", Mean 5'-3"

Preliminary test A-435 sigma loud  
C= 517" week

---

Test of Transmitter E-1.  
for noise - 3 cells.

With opening free, noise to 50  
" " closed " " 42

This shows that the noise either  
comes from jamming Microphone or  
its frying of the Audion

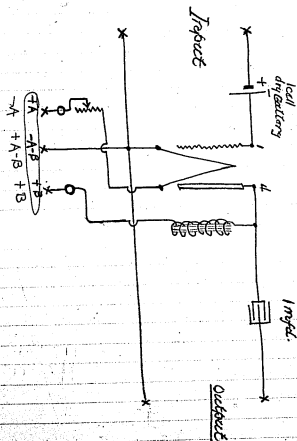
Test of Transmitter F-1  
for noise from battery.

Replaces cork in opening  
3 cells battery on Transmitter  
" " " " " 52  
" " " " " 44  
" " " " " 34  
" " " " " 28

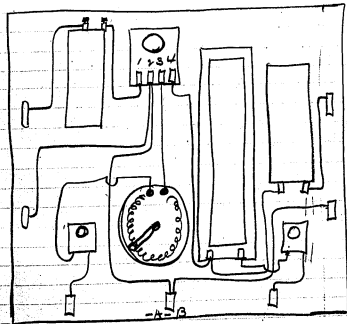
Battery disconnects, terminals shorted 28  
Battery fine disconnects, terminals shorted 16  
Batter loose from Audion, no input circuit 12



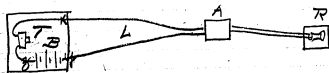
# Wiring Diagram of N.E. 1 stage amplifier.



Assembly of N.F.  
1 stage amplifier.

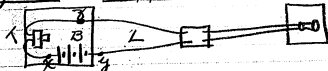


# Test of Transmitter E-1, tune and amplifier for noise.



- |   |    |
|---|----|
| ① As shown, 3 cells battery on T                                | 52 |
| ② As shown, 2 cells battery on T                                | 44 |
| ③ As shown, 1 cell battery on T                                 | 34 |
| ④ Battery disconnected, y & z <sup>series</sup> short circuited | 28 |
| ⑤ Battery disconnected, x & y short circuited                   | 16 |
| ⑥ Line L loose from A. Only amplifier & receiver in circuit     | 12 |
| ⑦ Repeating ④ to contrast with next experiment                  | 32 |
| ⑧ As T unit x & y open  | 28 |
| ⑨ Repeating ⑤   | 16 |
| ⑩ Same as ⑨ but with x-y open                                   | 32 |

Test of Transmitter E-1,  
tire and amplifier for  
noise after B battery  
has been insulated on  
glass - stopper in I



- ① As above, 3 cells on T 52
- ② " " " " " T 44
- ③ " " " " " T 40
- ④ Battery out, x, y connected together 24  
 (noise changes to dynamo note)
- ⑤ Same as 4 except x, y open 28  
 (dynamo note still the most prominent)
- ⑥ Tent cut also, <sup>very</sup> y, z connected together 14  
 (dynamo noise slight)
- ⑦ Same as 6 except y, z open 30
- ⑧ Then disconnected talking  
 telephone both ends &  
 took P over 50

We now pull out primary of input coil 15  
 Entirely dynamo



⑨ Bell receiver, substituted for  
T<sub>1</sub> and 3 cells of battery on  
line L.

Noise 80% dynamo  
70% roar

Cuts out at

28

⑩ Then put T with rubber  
stopper in opening in place  
of Bell receiver, and 3  
cells of battery on line  
L

Noise = 20% dynamo  
80% roar

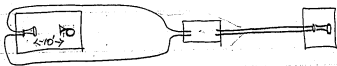
Cuts out at

56

Dynamo is of course weakened  
by big resistance of Microphone -

Therefore there is a roar from  
Micro - Street Car going past  
roar increases 50% showing  
Micro is jarred & this  
produces roar -

Preliminary comparison  
of regular telephone  
and of amplification  
by 1 and 2 audion  
bulbs.

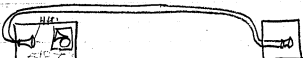


- ① With two stage audion.  
Reel received as transmitter, 10' from  
open phonograph, NC Country  
reel #1 used.  
Can hear to 60
- ② With 1 stage audion,  
without input or output  
coils 14
- ③ Audion out out, telephone  
straight through to hook 30

These results do not seem  
right - that the two stage audion  
only amplifies to twice as much  
as straight direct and one stage 1/2

## Comparison of Audions with straight circuit.

①



- ① Reel runner 4' from phonograph  
in box playing W.E. Co. counting  
record #1.  
dear to 12. 12  
No noise

- ② 1 stage audion in circuit  
with Bunnett 11-2800 input  
and 520-100 output coils. 8  
(no noise)

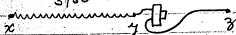
- ③ 2 stage audion in circuit  
with Bunnett 11-2800 input  
and 520-100 output coils  
slight noise, mostly  
dynamo hum  
Read to 48.

Measurement of resistance  
change of E-1 transmitter  
when current is flowing.

- 1 = 3200 ohms with bridge  
1 cell battery .5 milliamp 1.4 volt
- 2 = 4000 ohms with bridge  
1 cell battery .3 milliamp. 1.4 volt
- 3 = 2200 ohms with bridge  
1 cell battery .6 milliamp 1.4 volt.

This is too rough a test to  
show what Mr. Edison wants,  
whether the resistance of the  
microphone changes when  
current flows through it.

Then tried connecting 3750 ohms  
in series with microphone  
and measuring voltage around  
each.



showed 1.4 volts X-Z .08 volts  
X-Y .12 vgs.

1.374.01337

= .0185

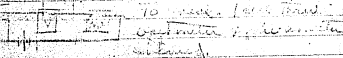
This shows that the resistance of the voltmeter is too low to measure such emfs.

Measured and found that the resistance of the 3 volt scale = 350 ohms.  
Of the 150 ohm 17,500 "

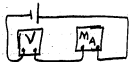
This means if used as a mill-ammeter:  
On 3 volt scale, 1 volt = .00285 amp.  
On 50 " " 1 " = .0005714 "

On my multi-scale  
ammeter & voltmeter -  
1.5 volt scale = 74.8 ohms  
15 " " = 748. ohms  
150 " " = 7480. "

1 Volt reading on 1.5 volt scale = 0.1337 amp  
1 " " 15 " " = .001337  
1 " " 150 " " = .0001337



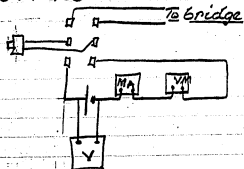
To check tried.



Oscillator showed 1.37 on 1.5 scale  
Milliammeter .0185

$$1.37 \times .01337 = .0184169.$$

Measurement of Resistance  
of E-1 without and with  
current.



$$\begin{aligned} \text{Bridge} &= \textcircled{1} \quad 1580 \text{ ohms} \\ \left\{ \begin{aligned} V.M. &= .2 \times .002857 = .0005714 \text{ amp.} \\ V &= 1.4 \text{ volts} \\ R &= 1.4 \div .0005714 = 2450 \text{ ohms} \end{aligned} \right. \end{aligned}$$

$$\begin{aligned} \text{Bridge} &= \textcircled{2} \quad 4800 \text{ ohms} \\ \left\{ \begin{aligned} V.M. &= .03 \times .002857 = .00008571 \text{ amp.} \\ V &= 1.4 \\ R &= 1.4 \div .00008571 = 16,334 \text{ ohms.} \end{aligned} \right. \end{aligned}$$

$\textcircled{3}$

Resistance of M-1  
Microphone.

①. resistance with bridge

Current

4 mill amp.

1.32 V.M. Reading

Volts

1.4.

to 13.

12 + ohms.



### Test of M-1 Microphone.

Mr. E had Moore bring up his microphone for test.

With 1 cell - with audion as before, door open, could hear to 60.  
With 1 cell - door closed, to 60.

Then put on musical record (for test). Quality very poor, jumbled and could only hear lower register but to 60.

Adjusted and put on more records. Improved quality but could not hear so far to 50.  
Still muffled & only low.

Adjusted further. Improved quality ~~at~~ expense of quantity so as to hear only 44.

Then used 2 cells, hear at 50

Fair quality  
Then used 3 cells, 44  
Quality poor

Used 7 cells & readjusted  
quality better. 54.

On test next morning  
heard with 7 cells  
musical record at 54

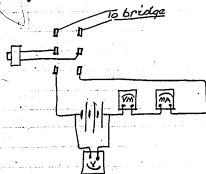
Same with M.E. talking  
record 24  
(not as much noise with M-1)

Test of E-4 mounted in  
6" x 6" x 6" lead block - enclosed  
to 150.

2 cells battery, door open	talking word	60
" " " " closed	" "	48
" " " " music	" "	56
3 " " " "	" "	60

more noisy than M-1 but  
noise seems to be that carried  
by the air around.

Measurement of Resistance  
of E-4 in lead block.



①  
 Bridge showed 3700  
 $IM = .09 \times .002857 = .00025686 \text{ amp.}$   
 $MA = 1$   
 $V = 1.4 \div .00025686 = 5444$   
 $5444 - 350 = 5090 \text{ ohms}$   
 Jumped 1390 ohms with current

②  
 Bridge showed 5000  
 $IM = .07 \times .002857 = .00019999$   
 $I = 1.4 \div .0002 = 7000$   
 $7000 - 350 = 6650$   
 Jumped 1650 ohms with current  
 over.

(3)

Bridge = 4000

$$M = .08 \times .002857 = .000228$$

$$V = 1.14 \div .000228 = 6087$$

$$6087 - 350 = 5737$$

Jumped 1737 ohms with current

(4)

Bridge = 2260

$$M = .14 \times .002857 = .00039996$$

$$V = 1.14 \div .004 = 3500$$

$$3500 - 350 = 3150$$

Jumped 890 ohms

### Test of M-1 Microphone.

2 cells battery, musical record

don closed hear to

Typewriter in next office

making so much fuss I can  
not tell quality.

Listening at r-v, quality not  
very good, uneven. Arguments  
some notes diminishes others,

Suggest that the steel carrying  
carbon contacts on M-1 be eliminated  
and these contacts be carried direct  
on diaphragm to save weight.

# Test of M-R Microphone.

2 cells battery, music record <sup>open</sup> 42  
 2 " " " " <sup>closed</sup> 28  
 Not loud enough and room  
 noises to judge quality.

Rubber stopper in goose neck  
 2 cells battery, music record <sup>open</sup> 36  
 " " " " <sup>closed</sup> 14  
 Much better quality of what I get  
 is better, cleaner & sharper  
 & clearer.

Mr. E. then took off all but  
 1 pair of fingers and adjusted  
 these so as to have more weight  
 1 cell battery - music record - <sup>open</sup> 46  
 1 " " " " <sup>closed</sup> 26

### Test of Tuned Reeds.

Tried to tune up new vibrator to old, heavy spring, wooden base one. Found it necessary to push weight back as far as possible or remove to make old one fast enough to synchronize with the new.

When tuned, the new one would quickly respond from 6' away.

Found that when its magnets were placed close in, the swing was damped. This may be a direct damping action due to the generation of induced current but I believe the natural period of vibration of the reed is changed by the change of amount of controlling force due to the addition of the force of the magnets.

Then tuned up the small reed on cast iron base to heavy reed. Both now respond each time.

- ③ A = vibrating  
B = responds (because turned)  
D = humming  
E = closed.

Within 4 seconds after  
A is started can hear B very  
plainly.

- ④ Repeat 3 but using  
both magnets on B  
connecting blue to blue  
Can hear plainly, sharp  
& clear.

- ⑤ Repeat 4 but connected  
blue to purple terminal  
Can hear but not as plainly  
as before. Apparently blue  
to blue connects magnets  
in proper direction.

- ⑥ Connected magnets in parallel  
blue to blue & purple to purple.  
Can hear but not as well  
as before.

⑦ Connected magnets in parallel, blue of one to purple of other. Settled than ⑥. This is the right way for parallel connection. Series connection seems to give better effect than parallel.

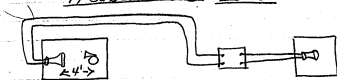
⑧ Removed the old master vibrator to floor near bench and connected electrically to magnet of new vibrator. after having first put similar magnets on master vibrator.

The second vibrator did not respond.

⑨ Tried experiments in response in various parts of my room. Found that second had would respond from any part of bench but not from any other part of room, proving that the motion was conveyed through shaking of bench.



Test of Magnetic  
Transmitter E-6



Magnetic receiver 4' from  
phonograph in box

Audion with Bunnell 11-2800  
input and 520-100 output  
coils.

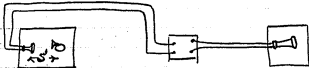
E-6 hear to  
(Quality poor - full, slow)

20

Bell telephone hear to

48

Test of special receiver  
against standard.



- ① Connected up coils of receiver in series to get maximum effect.

This showed two interesting phenomena.

The sound is different from ordinary receiver or making contact with battery, in place of the sharp click there is a double sound as if it took the diaphragm an appreciable time to travel to its limit.

When currents traverse magnets so as to assist them the sound is less loud than when it traverses the opposite direction. This is probably due to the

Small section near the  
recoiler. The permanent  
magnet is so much larger  
than this section that it  
is normally saturated. An  
increase in magnetic  
strength due to the coils  
draws but few additional  
lines through. A decrease  
in strength due to opposed  
coils however changes  
the number of lines  
greatly.

- ① Bell telephone as  
transmitter, 5' from  
phonograph in box  
connected directly to  
recoiler

Could hear with Bell  
Receiver plainly. Could  
not hear with special  
receiver.

- ② They took phonograph  
out of box and brought

transmitting receiver up  
until could hear with  
Special receiver, Transmitter  
1 ft. from Horn.

I hear Special Receiver <sup>connected in series</sup> to Bell " " 18
Special receiver connected in parallel to 60
10

Then tried to see if could  
hear low frequency through  
special receiver.

Connected large vibrator  
with magnet.  
could not hear at low  
or high frequency direct

Then connected buzzer in  
series

Can not hear with  
vibrator still or going.

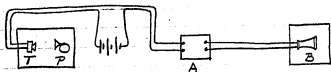
Then connected in auction  
using special receiver.

Car not hear

Then put on Bell receiver.

Car hear very plainly

# Test of Transmitter E-31.



- ① Set up usual way with 1 cell battery, phonograph in box, door open.  
Could hear nothing.
- ② Then had Dawson shout in T.  
Could just hear.
- ③ Then put bell telephone in place of T.  
Could hear loud & clear.
- ④ measured resistance of T.  
Found 37500 ohms by bridge  
30,450 " " ammeter  
v. o. meter.
- ⑤ Then had Mulner take out all but 3 discs to diminish resistance.  
Found open circuit due to broken

tin foil strip on diaphragm.

- ⑥ Then had strip renewed  
Resistance with 3 discs 2200 ohms  
by bridge 1531 ohms by ammeter,  
ohmmeter method.
- ⑦ Then connected up in usual  
method with 2 cells of  
battery, door open.  
Could not hear at all
- ⑧ Then had Dawson talk directly  
in opening of T.  
At first, listened & broke - then  
settled down and talked very loud  
and very clear.
- ⑨ Then tried ⑦ over, with door  
open.  
Could not hear.
- ⑩ Then put rubber stopper  
in opening of T. Door open  
Could not hear.

⑪ Mr. E had Meilner cut down the weight on the arm of T so as to give less pressure and to replace total number of 10 discs. Could not hear.

⑫ Had Dawson Tack direct in tube of T.  
Could hear faintly but the transmission showed breaks - was choppy & broken.

⑬ Mr. E had Meilner put carbon contact on weight so that contact would be carbon to carbon and not carbon to brass. Could not hear.

⑭ Had Dawson tack direct into T.  
Could hear faintly. Sometimes with blasts. At times even palisade but very faint.

⑮ Found resistance as set up to be about 100,000 ohms.



Mr. E proved by putting weights on the carbon discs, that these must be separated by a molecular air space, hence the enormous resistance.

- ⑩ Mr. E then had Melroy roughen the discs, using 4 of them with 2 cells of battery.  
With door open 60  
" " closed 40

(External noises especially loud this morning because of high wind rattling shacks & blundering and several people talking outside booth)

- ⑪ Mr. Edison then wanted us to test quality by reading from news paper & etc.  
With resistance in could hear about 40%

- ⑫ Put Bee Telephone in place of transmitter  
Door open to 4  
Closed to 0

Shows that so called  
dynamo noise was  
really dynamo noise

(19) Mr. E had .003" steel diaphragm  
put in Bell receiver as  
transmitter. Electrolysis for  
hushing was cut off, then  
so "dynamo sound" stopped  
I heard this to 14.

(20) ~~Mr. E had Medner make~~  
~~diaphragm for Bell transmitter~~  
~~of .003" with .003"~~  
~~steel disc 1" diameter in~~  
~~center.~~  
~~I heard to 10~~  
~~Dynamo noise gone. This~~  
~~I do not understand.~~

(21) Mr. E had Trailor make  
special diaphragm for Bell  
Receiver used as transmitter  
X .002" mica



Door Open.

Paper ring in - not clamped  
Hear to  
(No dynamo sound)

12

(21) Paper ring out, not clamped but  
diaphragm close to magnets 22  
No dynamo sound

(22) Clamped, steel opposite side  
of diaphragm from mica 28  
(No dynamo sound) But yet

(23) Same as above, door  
closed 10

(24) Reversed diaphragm, steel  
next to magnet. Door closed  
Can't hear, Diaphragm touches  
magnet.

Test of 2 stage audion  
against 3 stage.

Used phonograph in box.  
Regular Bee Receiver in  
Molnar's room in regular  
transmitter position as  
transmitter. Door open

With 3 stage audion	5R
" 2 "	12

Door closed

3 Stage Audion Regular Bee T.	36
" " Mr. E. T	—

Connected up outputs of  
3 stage audion to inputs of  
2 stage audion.

With Bee Receiver on  
transmitter table, with door  
closed hear to

60

Box at 0 Loud

Noise 100% (95%) Sound 100% (5%)

Noise consists of a continuous hiss and very high pitched whistles interspersed with periodic cracks & pops

Box at 30

Noise 10% (50%) Sound 100% (50%)

Box at 60 (1/2%) (1%) Sound 2% (99%)

Test of 5 stage amplifier using Bunnell 11-2800 input and 5R0-100 output coils.

Circuit very noisy, apparently worse than last night when the W.E. input and output coils were used on 3 stage.

Noise does not diminish at 30 as before

Hear phonograph to 38

Found that in making these connections, we did include the resistances in shunt with the input circuit.

Connected up putting Bunnell coils in place of W.E. input and output.

Result very poor. Lots of noise. Sound low.

Then cut off 2 stage audio, using 3 stage only.

Both noise and sound weak. Could only just hear Dawson talking distinct in Beebe Receiver as transmitter.

### Test of 3 stage amplifier.

To insure against mistakes, connected up 3 stage amplifier again.

With door open, could not distinguish phonograph. Changed Bell receivers. Got phonograph to 50

Noise Pronounced. With 1st Bell receiver used the dynamo noise was especially prominent.

With the second one used, the dynamo noise largely disappears and a high pitched non periodic roar appears.

It may be that the second is better than the first because the periodic phonograph sound is more pronounced with the non periodic roar than with the periodic dynamo sound.

This was taken with Rho 9700

1st switch Low  
2nd switch high

Changed 1st switch to high.  
Got periodic pump noise  
showing condensed discharge

Noise increased with this but  
was not able to hear phonograph  
at any point.

Changed 1st switch to Low  
2nd " " to Low

Noise very much diminished  
I hear phonograph to 16

Leaving 1st switch at Low  
2nd " " at high  
put Rheo at 5000

Ideas to 40  
Rheostat on 1000 (imm. later)

2nd switch to 46

Rheostat at 500 36

noise reduced. Rheo to 100 16

Rheostat on 100 16

noise reduced. Ideas to 16

① Rheostat at 100  
1st switch high  
mid " high  
Ideas to

56

② Same Rheostat at 200  
High pitched noise. Pump  
annoying  
Can hear only to

8

③ Rheostat at 100  
Again get phonograph to  
(Pump sound annoying)

54

④ Rheostat at 50

34

⑤ Then connected up with 2  
stage audio  
Rheostat at 100  
1st switch high  
mid switch high  
Sing high pitched notes -

⑥ Then tried varied rheostat  
positions & changes of switch  
Got only a variety of noises

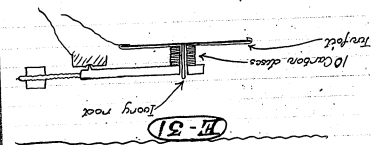


(7) During this time grumbling  
several positions among  
them #4 w/ 1st - 2 stage audio.  
Noise stopped and stayed  
quiet.  
Heard phonograph with  
door closed to 60  
noise awful at low  
readings but rapidly  
cuts out.

(8) Then opened rheostat circuit  
by switch. Could still hear 60  
at

(9) Then threw switch to  
high, leaving rheostat  
open.  
Noises on line very much  
reduced - only high pitched  
whistle and a periodic  
quint. Can hear to 60

(10) Closed switch to Rheostat  
which was at 9000  
Same as (1) in results 60  
hear to



- (11) Changed Rheostat to 900  
Hear ~~the~~ 60
- (12) Then changed switch #1  
to low, Rheostat 900  
noises increased but  
could hear phonograph  
distinctly at 60
- (13) Permanently adjusting  
pound to 4 of first addition  
of two stage gains high  
pitch note x diminishes  
Sensitiveness to 46
- (14) Removing this ground  
brings back as at 12 th 60
- (15) A 1 mfd condenser  
around the regulator here  
diminishes the noise  
but does not diminish the  
phonograph. Hear loud at 60

[THIS BOOK WAS USED IN BOTH DIRECTIONS.  
THE FOLLOWING PAGES WERE FILMED FROM  
THE BACK END FORWARD.]

## Description of Transmitters.

(E-1)

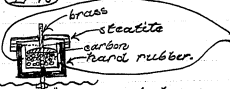
carbon diaphragm,  $2\frac{1}{16}$ " diam.

carbon back, 1/8" thick,  
.025, inclined  $15^\circ$ .



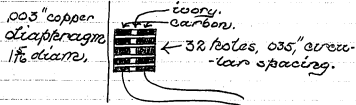
(E-2)

Inertia Type.

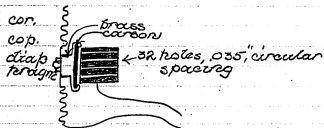


corrugated copper  
diaphragm,  $1\frac{1}{8}$ "  
diameter.

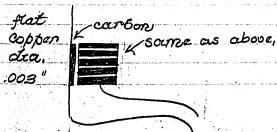
(E-3)



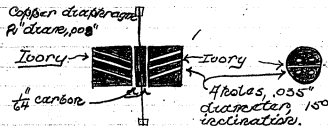
(E-4) - 1st form



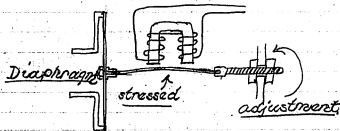
(E-4) - 2nd form,



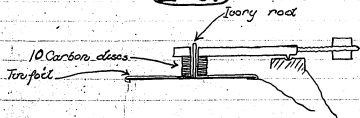
E-5



E-6



E-31



(S)

(H)

(E)

(2)

(11)

A 1 inch diameter  
around the bottom of  
diameter to make the  
but does not diminish the  
phenomenon, then level of 60.

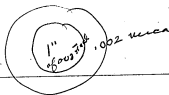
lump look as if 1/2 ft  
forming this ground 60

formation, stretching  
ground to 1/2 ft after  
it has stage quite high  
then note x diameter  
phenomenon is 46

disturbance of  
ground from observation  
forces increased but  
to low, raised 9000  
of which changed out of 1 60

change level to 900  
then to 60

[ITEM(S) FOUND IN BOOK]



paper ring in - not clamped  
#12 on box - 003 steel 1" dia  
no dynamic sounds

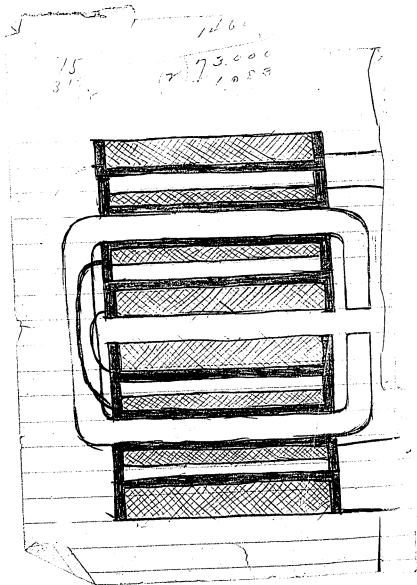
Paper ring out, not clamped  
but closed #12, on box -  
no dynamic sounds -

29  
28  
27  
26  
Clamped gate #28 on box  
But yet no dynamic  
sounds steel opposite side  
to magnet - on knee -

Door shut, #10 on box

Reversed dia steel next magnet  
door closed, not clamped tight  
Can't hear - dia touching magnet

[ITEM(S) FOUND IN BOOK]



**Notebook Series -- Notebooks by Experimenters Other Than Edison  
Navy and Wartime Research Experiments -- A. M. Kennedy Books  
Notebook, N-17-04-05**

This notebook was used by Absalom M. Kennedy in April 1917 for notes on experimental work for the U.S. Navy performed under the direction of Edison during World War I. The book consists primarily of notes on experiments involving amplifiers, audion circuits, transmitters, and transmitter parts. Also included are notes describing experiments with the "Edison Effect." Several entries include notations by Edison or remarks by Kennedy about his opinions and suggestions. The notes indicate that E. Rowland Dawson and Joe Mellner also worked on these experiments and that some of them took place at sea near Sandy Hook and Red Bank, New Jersey. The front cover is labeled "Experiments #3 March 21 -." The pages are unnumbered, and some have been removed from the middle of the book. Approximately 120 pages have been used.



17-04-05

Jewett  
Colbert  
Shreve

69593  
*Acme Co.,*

MFG. STATIONERS,  
96 JOHN ST.  
AND  
19 PLATT ST.  
NEW YORK.

On ~~disconnecting~~ unsoldering input coil  
and connecting back by touching  
terminals, got awful dynamo  
noise from receiver, probably  
due to imperfect contacts.

Tried to get better contacts

### Experiments with W.E. 3 stage Amplifier.

- ① Switch Low - mid switch high  
Rheostat 9000.  
Door open 60  
Door closed 42
- ② Then disconnected W.E. output  
coil and substituted Bunnel  
520-100  
Door open 58  
Door closed 26
- ③ Then unsoldered contacts  
of input coil and put back  
by wrapping.  
Receiver makes awful  
dynamo noise so that  
phonograph can not be  
heard.
- ④ Nuts over these contacts  
and clamped with pliers.  
noise same as before.

⑤ Connected Bunnell.  
 11-2800 Coil in as input.  
 Door Open hear to 16  
 Door closed " " 2

Mr. Edison decided that the  
 Bunnell coils were insufficient  
 as compared with the Western  
 Electric.

Took #47A (Qew #9) (1:1 ratio)  
 apart. Superficial examination  
 shows a closed circular iron  
 core wound with 4 coils  
 of about #26 wire on a  
 circular core insulated a  
 coarse woven cloth like  
 cheese cloth between.

Mr. E then had me telephone  
 N.E. Co. (Mr. Jewett was out-  
 got Mr. Colpitt) to get  
 winding specifications on  
 #N 192 and N 188 repeating  
 coils as input and output.  
 These to be the size and  
 number of turns each on

the primary and secondary  
coils and the dimensions  
and kind of iron in the  
core.



*Winding Specifications  
of W.E. Repeating Coils  
#s 188-W and 192-W.*

*W 188. Output,  
Impedance Ratio of windings  
6000 to 2000.*

*Has 4 coils of which 3-4  
and 7-8 are low and 1-2, 5-6  
high.*

*3-4 and 7-8 each has 1150 turns  
#25, single cotton covered  
copper wire.*

*1-2 & 5-6, each has 2000 turns  
#31 single cotton covered  
copper wire.*

*Core of silicon steel punchings.*

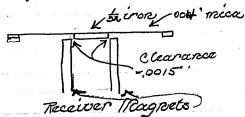
W192. Input

Impedance Ratio of  
windings = 900-500,000.

Coils 1-2 & 5-6 are made up  
of 6 sections each containing  
45 turns black enamel and  
silk insulated #19 copper  
wire & 270 turns for the two.  
Coils 3-4 & 7-8 are wound over  
these in 6 sections each  
containing 1160 turns #32  
Black enamel and silk insulated  
copper wire

Core of silicon steel.

## Test of Special Receiver



Used 3 stage audion  
 1st switch Low  
 2nd High  
 Resostat at 9000

With regular Bell receiver  
 Door open 60  
 Door closed 38

With special Receiver  
 Door open 50  
 Door closed 18

Readjusted this -.010" farther  
 away from magnets  
 Door open 54  
 Door closed can not distinguish

The quality here is too full, gives  
 a prolonged note rather than  
 the clean, clear articulation

Then adjusted so that iron  
was .005" closer to magnet. 100 turns  
Door Open to 60  
" Closed to 52

With regular Bell Receiver as  
Transmitter  
Door Open to 60  
Door Closed to 40

Special Receiver as transmitter  
adjusted so that armature  
is .015" within magnet  
Door Open to 54  
Door Closed to 38

Adjusted back so that the  
armature was .005" within the  
magnet -  
Door Open to 60  
Door Closed to 50

Used Bell Nipmans Transmitter  
Door Open to 60  
Door Closed to 56



bread  
family food  
cost of living

## Quality Test of Magnetic Transmitters

Door opens - standing at phone  
Receiving

Meremans Transmitter	5%
Standard Bell Receiver	10%
Meilners Transmitter	25%

In all of the above I could  
hear practically only the  
usual sounds. Davidson  
then came closer & spoke  
louder so as to bring out  
the consonants.

standing at door Receiving

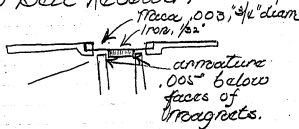
Meilners Transmitter	60%
Standard Bell	60%
Meremans Transmitter	58%

The above taken at 1/6 on  
box.

This is % of words

got.  
Used 3 stage amplifier.  
1st Switch Low - 2nd Switch high  
Rheostat 9000

# Test of $\frac{3}{4}$ " diaphragm 010 Bell Receiver.



Used 3 stage amplifier  
 1st switch Low  
 2nd " High  
 Chevrolet 9950  
 Standard Bell Receiver.

Door Open 58  
 Door Closed 38.

New  $\frac{3}{4}$ " diaphragm receiver  
 Door Open - can not hear  
 Got Dawson to talk over.  
 Not very loud.

# Sizes of interference tubes.

Vibrations per sec	Short inches	Long inches	Diameter of tube, inches.	No
150	44	88	2	1
175	38	76	2	2
200	33	66	2	3
225	29.7	59.4	2	4
250	26.4	52.8	2	5
275	24.2	48.4	2	6
300	22.	44.	2	7
* 325	20.42	40.84	2	8
350	18.84	37.68	2	9
375	17.67	35.34	2	10
400	16.5	33.	1½	11
425	15.58	31.16	1½	12
450	14.66	29.32	1½	13
475	13.93	27.86	1½	14
500	13.2	26.4	1	15
525	12.6	25.2	1	16
550	12.	24.	1	17
575	11.5	23.	1	18
600	11.	22.	1	19

Test of 3 stage amplifier  
with new, rubber insulated  
input coil.

1st switch Low  
2nd " High  
Rheostat 700

Hear noise to 60. This  
noise is a high roar and  
dynamo hum with noise  
like a pump sucking  
which happens about  
20 times per minute

Don't open hear to 50  
Don't close " can not  
distinguish phonograph.

This is not as good as  
before.

Then reversed connections  
back on pickup coil to  
be sure this was not the  
trouble.

Still get noise to 60  
it is more nearly uniform

but apparently as loud as before.

With door closed can not distinguish phonograph.

Then tried  
1st switch high  
2nd " high  
Rheostat 800

Noise worse. phonograph  
Could not hear with door closed.

Then tried rheostat at 400

Noise diminished  
Could not distinguish phonograph with door closed.

Then tried 1st switch on low.  
Noise about same  
Could not distinguish phonograph.

Put 1st switch back on low, 2nd on high and the Rheostat at 900

Put on ground connection.  
Noise slightly diminished  
Can not hear phonograph with

door closed.

Sunday morning.

1st switch Low  
2nd " High  
Rheostat 9900

Noise slight Cut out

50

Door open hear to

60+

Closed "

52

Noise is uniform, slight hiss  
mixed with a high pitched note.

## Test of Amplifiers

- ① Used 3 stage, standard coils and connection.

1st switch Low

2nd switch High

Rheostat 9900.

Noise slight. Cuts out 50

Door Open Hear to 60+

Door Closed Hear to 52

Noise is uniform and consists of a hiss mixed with a high pitched note. "Pump like sounds 8 per minute, probably condenser discharge occurs."

- ② Then connected new hand welded insulated coil in place of regular.

High pitched noise varied, switches, rheostat and took off input and output wires. Still noise.

Found that by touching one side of input wire and ground noise was

diminished. Tread condenser  
in same place with same  
effect.

pot. switched Low  
and High  
Phostat 9000.

Condenser, <sup>input</sup> line, one side  
to ground connection (not grounded)

Input coil, 119V special  
unshielded

Door Open to  
Door closed to

60+  
54.

③ Put 2 mfd condensers  
around resistor in booth

Noise seems diminished

Door Open to  
Door closed to

60  
42

④ Put 2 mfd Condenser  
around input line & ground con.  
Noise diminished into out. 54  
Door Open  
Door closed

60  
58  
53



Shunting receiver in booth  
cuts down noise but  
diminishes sensibility.

- ⑤ Put 1 mfd condenser  
around receiver in booth.  
Door open to 60  
Door closed to 46
- ⑥ - With fresh A battery on  
amplifier, again tried effect  
of connecting 2 mfd.  
Condenser from one side  
of input line to ground  
connection.  
Cut down noise, which  
was high pitch note 75%
- ⑦ Then tried 1 mfd additional.  
noise changed from note  
to roar. Not as good.
- ⑧ Then tried resistance across  
this input line to ground  
connection.  
Diminished noise  
10,000 ohms about to  
same amount as 2 mfd  
condenser. Cut this  
resistance by steps to  
0.

This effect of shorting one side of input ~~with~~ line with ground connection is peculiar.

This ground connects to +A-B Battery and to the center of the primary coil of input coil. The +A-B Battery multiplies in on one side of the filament circuit of each audion lamp.

Diminishes noise only slightly.

- |   |   |     |
|---|---|-----|
| ⑨ | 10,000 <sup>Ω</sup> between input line and ground connection. | 60+ |
|   | Door Open   | 50  |
|   | Door Closed   |     |
| ⑩ | 5,000 <sup>Ω</sup> as above                                   | 60+ |
|   | Door Open   | 54  |
|   | Door Closed   |     |
| ⑪ | 2,000 <sup>Ω</sup> as above                                   | 60+ |
|   | Door Open   | 54  |
|   | " Closed  |     |
| ⑫ | 1,000 <sup>Ω</sup> as above                                   | 60+ |
|   | Door Open   | 56  |
|   | Door Closed   |     |
| ⑬ | short circuit as above  | 60+ |
|   | Door Open   | 56. |
|   | Door Closed   |     |

⑭ They changed this, connect  
ion to other leg of input  
circuit marked TO  
Door open 60+  
" closed 56,

⑮ Then connected input  
line direct to new input  
coil. 3 and 8 of this  
to connections in box  
this cutting out the  
shunt & series resistances  
in the input circuit.  
Makes peculiar roaring  
noise interspersed with regularly  
spaced clicks.

Door open

30

While making above  
connections found solder  
loose on connection to # 3  
of input coil & resoldered  
it.

- ⑩ Then connected input lines to input terminals of box.  
The high pitched note heard before had disappeared and in its place a sort of roaring sound interspersed with clicks.

Then connected one line to ground connection  
Noise diminished 80%

Door open 60  
Door closed 58

- ⑪ Then replaced output coil of box by new insulated output coil.  
Door open 60  
Door closed 58

- ⑫ Then connected 3 step audition box as input to 2 step as output.  
Bad case of chirruping.

①9 Connected +A-B battery  
of 7 stage to ground connection  
of 3 stage vts.  
Too quiet. I am  
afraid of it.

Door Open  
Door Closed

30  
20

②0 Then removed  
connection from input  
line to ground connection  
Circuit very quiet

Door Open. Can not hear.

②1 Then removed connection  
+A-B of 2 stage from ground  
connection of 3 stage.  
Awful low pitch noise

②2 Then having removed  
above connection, connected  
+A-B battery of 7 stage  
and ground of 3 stage to  
ground

Door open      Can not hear  
phonograph

(24) Connected ground connection  
of 3 stage to #3 of 1st  
audion of voltage set  
Door open to 30

(24) Ground of 3 stage set  
to #4 of 1st audion of  
voltage set.  
Door open to 60+  
Door closed to 54.

Suggestions for improvement  
of 5 stage amplifier circuit.

- ① Keep input and output  
apart, conductively, &  
inductively.
- ② Shield input circuit throughout.  
Also all cross connecting  
wires of lead covered cable.
- ③ Put B Battery of 2 stage  
out in tin lined box, thoroughly  
insulating the cells from each  
other.
- ④ Mount units of 2 amplifier  
set on hard rubber and  
mount all on a board.

### Test of Diaphragms.

Used 3 stage Amplifier.  
1st switch at Low.  
2nd " " High.

Phonostat 9900.

2 wires of input 4 grounded  
Ground connection "

① Standard Bell Receiver as transmitter  
Door Open 58  
Door Closed 48.

② Mica Diaphragm .025"  
Iron Disc .010" x 1.00".  
Disc Outside, Away from Magnet  
Quality - Better than ①. Not so  
much false Ring & noise  
Door Open 78  
Door Closed 58



Remind Mr. E  
of pencils in booth  
of Sandy Hook

W.E. suggestion of  
tuned circuits between  
audio units & time sub  
any note

③ Mica Diaphragm .002"  
Iron disc on center .003" x 1".  
Disc outside, away from magnet.  
Quality not as good as ② sharp.  
Door Open 46  
Door Closed 40

④ Mica Diaphragm .004"  
Iron disc on center .003" x 1".  
Disc outside, away from magnet.  
Quality little sharp.  
Door Open 50  
Door Closed 42

⑤ Mica Diaphragm .004"  
Iron disc on center .010" x 1".  
Disc outside, opposite magnet.  
Quality unpleasant noisy.  
Door Open 44  
Door Closed 40

⑥ Diaphragm of steel .003"  
Quality good & all material.  
Door Open 52  
Door Closed 46

- ⑦ Mica Diaphragm  
 Iron center fitting between  
 magnets. .001 $\frac{1}{2}$  clearance  
 projecting .005 below face  
 of magnets,  $\frac{1}{32}$ " thick.  
 Quality good. Clean.  
 Door Open 60  
 Door Closed 52

- ⑧ Mica Diaphragm .002  
 Special Iron Disc .020 x  $\frac{1}{16}$   
 shaped around magnets  
 .002 clearance .005 below  
 face of magnets



Quality good  
 Door Open 60  
 Door Closed 50  
 Door Open 52

For noises - look out for-

- ① Poor contacts (Sing & Roar)
- ② Induction from any source (Reproduce the source)
- ③ Coupling back between higher stage bottles and lower. (Sing & chirrup)
- ④ Gassing of battery -  
either A or B (Hissing & roaring sound)
- ⑤ Unbalancing of lines as to length, particularly as to their capacity. (Hissing & sing or change note on singing)
- ⑥ Leaks between or around coils.
- ⑦ Audion tubes maybe defective & should be replaced if suspected
- ⑧ Defective B Battery. Dry cells increase resistance & make noise

Test of plug in hole of photograph box.

- ① Standard Bell Receiver  
Cork in photograph hole  
Door open 50  
Door closed 42

- ② Standard Bell Receiver  
Door open 50  
Door closed 42

Plugging this hole in the photograph therefore makes no difference

Previous experiments made with output leads from 2 stage amplifier direct to receiver. But no regular output coil.

- ③ Regular Bell Receiver, Plug open 54  
Door open 54  
Door closed 46

④ As ③ but with Rec. Resonant  
faced away from Phonograph  
Door open 54  
Door closed 44.

⑤ as ④ but with phonograph  
turned to wall.  
Door open 54  
Door closed 42

⑥ as ④ but with phonograph  
in cabinet in Kennedy room  
Door open 48  
Door closed 36

⑦ as ② but with mute in  
horn of phonograph  
Door open Cant hear

⑧ as 7 but with phonograph  
out of box  
Door open 52  
Door closed 42

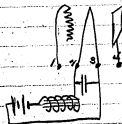
⑨ as ⑦ but with lid of  
phonograph box open  
Door open  
Door closed

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36  
26

Experiments on  
Audion Amplifiers  
by Mr. Scriber.

- ① Exchanging ground from + battery to - battery as shown on blue print changes and increases the noise.
- ② Putting an impedance in the A battery circuit, reduced the hissing, trying noise on the 3 stage amplifier.
- ② Putting an impedance in the A battery circuit of the 1st audion, cut down the hissing, trying noise. A condenser of 18 mfd. across the filament seemed also to keep



In this the 3 stage set had  
 a B coil on the 2d. audion in  
 place of L as. visual and  
 had impedance coil between  
 battery and 1st audion and  
 8mf. condenser around  
 filament. Ground connection  
 of set was grounded.

#### - 4 stage set.

- ① Input line disconnected to get  
 noise in set. 54  
 Hear noise to
- ② Same as ① but with cover  
 of 3 stage set on. 50
- ③ Same as ② but with input  
 line connected. 58
- ④ Same circuit as ③  
 Door open, hear to 60  
 Door closed, hear to 46
- ⑤ Mr. Scriven then put the  
 L type lamp back in the  
 2d stage of 3 stage amplifier  
 and connected up this to  
 receiver, leaving only a  
 3 stage set.  
 Door open, hear to 36  
 Door closed, " " 40

- ⑥ Mr. Deruena then found the  
A battery low, and raised  
to normal value  
Door open hear to 38  
Door closed hear to 6
- ⑦ Mr. Deruena then removed  
the ground connection  
Door open hear to 48  
Door closed " " 14
- ⑧ Mr. Deruena then exchanged  
lamps on 3d auction  
Door open hear to 46  
" closed " " 14
- ⑨ Mr. Deruena then put 1st  
switch on high.  
Door open 58  
Door closed (noise outside) 12(?)
- ⑩ Mr. Deruena then took off  
impedance & condenser from  
lamp  
Door open to 38  
Door closed to 22  
more noise



Scriven

- ⑪ Mr. Scriven reversed diaphragm  
in receiver & removed ring -  
Door Open 60  
Door Closed 52
- 9:15 PM.
- ⑫ Repeated 11 to guard against  
mistake.  
Door Open 60  
Door Closed 52
- ⑬ 1st switch changed to High  
Door Open 60  
Door Closed 60
- ⑭ As 13 but with Bell  
Receiver fixed down on  
plate glass  
Door Open 60  
Door Closed 44
- ⑮ As 13 but with muffler  
in horn of phonograph,  
box top open.  
Door Open 60  
Door Closed 54

⑥ As 15 but with lid of box closed  
 Door Open 28  
 Door Closed Cart pickups

⑦ 1st switch Low and "high"  
 Rheostat 9900  
 3d stage 1 tube in place if L  
 Phonograph - standard 60  
 Door Open 56  
 Door Closed  
 (noise very little, good)

⑧ As 17 but with L tube in this stage.  
 Door Open 60  
 Door Closed 58

⑨ Then began tests to localize & remove noise.  
 → Removed input wires. 40  
 Noise out at

⑩ Input wires on noise 44

(22) Input wires off. Binding  
posts short circuited.  
Noise 18

(23) Input wires on, extra  
impedance coil in 1st  
audion filament circuit  
Noise 36

(24) Same as 23 but diaphragm  
removed from resonator at  
transformer end.  
Noise 38

(25) As 24 but with 8 mfd  
condenser across filament  
of 1st diode.  
Noise 32

(26) As 25 but with Bee  
resonator, diaphragm out,  
across input terminals in  
place of input line  
Noise 28

②⑦ As 26 but impedance  
coil in filament circuit of  
2nd audion. 28  
noise  
(Picked up dynamo noise)

②⑧ As 27 but with type B  
buck in 2d stage in place  
of type R 18  
noise

②⑨ As 28 but with impedance  
put in in 27 removed 18  
noise

③① As 29 but with 4th stage  
audion added. 60+  
Door Open 60+  
Door Closed

③② noise reading of 31 with  
Pul. Reson., diaphragm removed  
connected across input  
terminals of 3rd stage amplifier 58  
noise

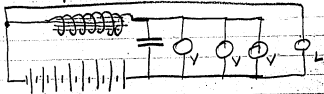
(32) As 30 but with Resonance  
upbeat down on plate glass  
Door open 60+  
" Closed 60+

(33) As 30 but with muffler  
in phonograph, lid open 60+  
Door open 60+  
Door closed

(34) As 33 but with lid of  
phonograph closed 60+  
Door open 54  
Door closed

Perts in 9 volt battery  
on 4th stage of amplifier.

With storage battery as B battery  
put high impedance coil in  
common with all V tubes, leaving  
L clear.  
10 or 12 mfd condens around  
battery and coil



Experiment of changing  
impedance coils of 3rd  
and 4th stages.

With 4 stage amplifier as  
set up

Noise 60  
With 4th & 3d stage impedance  
coils exchanged. 60+

Just heavah

Completed test of 4 stage set.

Noise figure

Just hear at 60  
Noise consists of slight fry  
or hiss, dynamic, sound  
and an occasional click.

Efficiency

muffin in Phonograph Horn  
Ed's open -  
Door open to  
Door closed to

Control 60

So much noise around, impossible  
to hear.

Test of Audibility Limit  
with 4 stage Audiotape.

- ① Muffler in Phonograph  
Box lid closed 60+  
Door open 56  
Door closed
- ② As 1 but with Bell removed  
in corner of Mulners Room  
Door open 60+  
Door closed 54  
More noise than 1, probably  
because transmitter is  
closer in contact with  
building by being close  
to wall.
- ③ Same as ① but with Bell  
removed just outside door  
in Music Room. Door between  
Keweenaw & Mulners room closed.  
Door to music room open 30  
Door " " " closed 0

Can not distinguish Phonograph.  
Other noises conceal it.

✓  
④ Same as 3 but changed  
record to Fox trot.  
Music Room door open  
" " " Closed

56  
57

⑤ Listened in for quality of  
music at 10 on horn  
Same position of receiver  
as in ④  
But 40% of the record.

⑥ Same as ⑤ but with box  
at 0  
Circuit gets 60% of melody.

⑦ Same as ⑥ but receiver  
moved to end of shelf

⑧ Same as 7 but with receiver  
out of music room, in



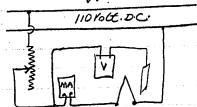
✓

## Relation of Readings of Receiver Shunt Boxes.

According to curve made out by Mr. Deinen, the readings of shunt boxes are relatively:

0 = 1 = 100" %	30 = 3%
2 = 1.3 = 77'	32 = 2.9
4 = 1.6 = 62.5	34 = 2.4
6 = 2. = 50.	36 = 1.9
8 = 2.4 = 41½	38 = 1.5
10 = 3 = 33	40 = 1.25
12 = 3.7 = 27	42 = 1.00
14 = 4.6 = 22	44 = 0.80
16 = 5.8 = 17	46 = 0.65
18 = 7.2 = 14	48 = 0.52
20 = 9 = 11	50 = 0.41
22 = 11.1 = 9	52 = 0.34
24 = 13.8 = 7½	54 = 0.27
26 = 17 = 6	56 = 0.21
28 = 21 = 4½	58 = 0.16
30 = 26.6 = 3¾	60 = 0.14

# ✓ Experiments with Edison Effect



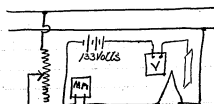
Current	Reading 1/3600 M.A. Scale	Difference	Reading 1-150 volt Scale	Difference
.150 amp	0. Volt.		0. Volt	
.160	.02	.02	.1	.1
.170	.09	.07	3	2.9
.180	.26	.17	9.5	6.5
.190	.62	.36	22.	12.5
.200	1.44	.82	38	16.
.210			44	6.
.220			49	5.
.225			51.	3.

C. represent  
 V. without Bx Diff  
 .000285  
 .000715  
 .001708  
 .00349  
 .00675  
 .00972  
 .01397  
 .01775  
 .02120  
 .02260  
 .02400

C. rep. V unit  
 133V. Battery  
 .000558  
 .00223  
 .00430  
 .00807  
 .01509  
 .02120  
 .02950  
 .03250  
 .05310  
 .06450  
 .07100

$R =$   
 237, 110  
 970, 000  
 121, 900

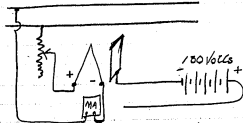
Further Experiments with  
 Edison Effect using  
 B Battery.



.000857  
 .0005714

Current Vero filament	Diff	V. without B. Battery	Diff	V. with 133V B. Batt	Diff
160		.5		1.5	
165	.005	1.25	.75	3.9	2.4
170	.005	3.	1.75	7.5	3.6
175	.005	6.1	3.1	14.1	6.6
180	.005	11.8	5.7	26.5	12.4
185	.005	17.	5.2	37.	10.5
190	.005	23.	6.0	51.5	14.5
195	.005	31.	8.0	65.5	14.0
200	.005	37.	6.0	93	27.5
205	.005	39.5	2.5	112.5	19.5
210	.005	42.	2.5	124.	11.5

# Further Experiments with Edison Effect.



filament Current	Volts, Plate to + filament	Volts, plate +130 volt batt. to + filament	Volts, plate +130 volt batt. to - filament
.160	0	2	65
.165	1	3.25	63.85
.170	3	4.25	71.5
.175	5	7.50	76.5
.180	7.5	12.50	81.
.185	11.5	19.50	84.25
.190	19.5	37.00	87.5
.195	26.5	54.	91.5
.200	38	90	94
.205	46	101	96.25
.210	50	126	102.5

✓  
Test of Diaphragms for  
Deflection under pressure.

Russian Iron

#1 = .0155-.0145-.0145-.015

Diameter  $2\frac{5}{32}$ "

Pressure	On	Off	Difference	Set.
0	.167	.167		
5	.185	.167	.042	0
10	.118	.167	.049	0
15	.110	.167	.057	0
20	.107	.166	.059	.001
25	.101	.166	.065	.001
30	.096	.167	.071	0
35	.088	.131	.043	.036
40	.082	.120	.038	.047
45	.076	.111	.035	.056
50	.067	.095	.028	.072
55	.059	.084	.025	.083
60	.051	.076	.025	.091
65	.048	.069	.021	.098
70	.040	.040	0	.127
75	.025	.045	.020	.122
80	.025	.043	.018	.124
85	.020	.039	.019	.128

# Russian Iron

#2 = .0005; .000; .000; .0015

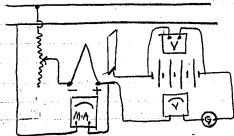
DIAMETER 2  $\frac{3}{32}$ "

Pressure	On	Off	Difference	Set
0	.154	.154		
5	.138	.153	.015	.001
10	.127	.152	.025	.002
15	.121	.151	.030	.003
20	.116	.150	.034	.004
25	.111	.150	.039	.004
30	.105	.146	.041	.008
35	.100	.141	.041	.013
40	.093	.128	.033	.028
45	.086	.119	.033	.035
50	.080	.108	.028	.046
55	.073	.099	.026	.055
60	X .066	.060	.046	.094
65	.046	.060	.026	.094
70	.045	.058	.013	.096
75	.044	.057	.013	.097
80	.041	.055	.014	.099
85	.037	.052	.015	.102
90	.032	.047	.015	.107

Russian Iron  
#3 = .027 - .027 - .0265 - .0265  
Diameter 2  $\frac{5}{32}$ "

Pressure	On	Off	Difference	Set
0	.150	.150	0	
5	.138	.150	.012	0
10	.132	.150	.018	0
15	.127	.150	.023	0
20	.125	.150	.025	0
25	.120	.149	.029	.001
30	.116	.148	.032	.002
35	.113	.147	.034	.003
40	.109	.1465	.0375	.0035
45	.105	.146	.041	.004
50	.102	.145	.043	.005
55	.097	.139	.042	.011
60	.092	.132	.040	.018
65	.090	.126	.036	.024
70	.0865	.124	.0375	.026
75	.081	.114	.033	.036
80	.077	.109	.032	.041
85	.073	.100	.027	.050
90	.067	.093	.026	.057

# Further Experiments with Edison Effect.



1 Filament Current	2 Volts, + filament to plate	3 Volts necessary to reduce col. to 0.
.160	* .75	65.
.170	✓ 3.	71.5
.180	✓ 9.	81.
.190	✓ 20.	87.5
.200	✓ 38.5	94.
.210	✓ 49.5	102.5
.214	52.	106.5



# Test of Diaphragms for Deflection under Pressure

# 4

Mica

.010

Diameter  $\approx \frac{5}{32}$

Pressure	On	Off	Difference	Set
0	.192	.192	0	0
5	.150	.192	.042	0
10	.143	.192	.049	0

Burst at 15 pounds

# Test of Diaphragms

#5

Mica

.0175

Diameter  $2\frac{5}{8}$ "

Pressure	On	Off	Difference	Set
0	.180?	.180?	0	0
5	.160	.184	.024	0
10	.150	.184	.034	0
15	.145	.184	.039	0
20	.142	.184	.042	0
25	.1375	.184	.0465	0
30	.131	.184	.053	
35	.			

Burst at 35 pounds

# Test of Diaphragms

# 6

Mica

.002

Diameter  $2\frac{5}{8}$ "

Pressure	On	Off	Difference	Set
0	.182	.182	0	0
5	.166	.182	.016	0
10	.159	.182	.023	0
15	.150	.182	.032	0
20	.145	.182	.037	0
25	.141	.181	.040	.001
30	.138	.181	.043	.001
35	.133	.181	.048	.001
40	.130	.181	.051	.001
45	.127	.181	.054	.001

Burst at 50 pounds

# Test of Diaphragms

#7

German Silver

.0105

Diameter  $2\frac{5}{8}$ "

Pressure	On	Off	Difference	Set
0	.190	.190	0	0
5	.145	.190	.045	0
10	.135	.190	.055	0
15	.134	.190	.056	0
20	.121	.185	.064	.005
25	.111	.175	.064	.015
30	.102	.150	.048	.040
35	.090	.130	.040	.060
40	.065	.100	.035	.090
45	.052	.083	.031	.107

Burst at 50 pounds

# Test of Diaphragms

German Silver

#8

.020

Diameter  $3 \frac{5}{16}$ "

Pressure	On	Off	Difference	Set
0	.188	0	0	0
5	.163	.188	.025	0
10	.152	.183	.031	.005
15	.147	.183	.036	.005
20	.139	.183	.044	.005
25	.133	.182	.049	.006
30	.128	.182	.054	.006
35	.125	.182	.057	.006
40	.122	.182	.060	.006
45	.117	.182	.065	.006
50	.112	.181	.069	.007
55	.107	.177	.070	.011
60	.102	.170	.068	.018
65	.097	.153	.056	.035
70	.091	.140	.049	.048
75	.084	.129	.045	.058
80	.079	.118	.039	.070
86	.071	.108	.037	.080
91	.066	.094	.028	.094
95	.055	.087	.032	.101

Preliminary Tests  
at Sandy Hook.

- ① Using transmitter #3 with  
break and 2 cells battery and  
with receiver #2.

In water, hear to  
In air, hear to

12"  
26"

- ② Same as 1 but using receiver #1  
in place of #2

In air hear to  
In water hear to

26"  
12"

- ③ Transmitter #1  
Receiver #1  
Hear in water to

45"

4/4/17. Weather - warm & fair

Put impedance in 1st audion  
B battery line.

At Sandy Hook

4/5/17

Set up Audion Set.

- ① Using Lead Covered Wire.  
Noise, slight roaring with  
slight bee noise.  
Cuts out at

52

- ② Put impedance coil in  
B battery circuit.  
Chirups badly.

4/5/17. Weather Cool. High Winds.  
Rain & storm in afternoon  
and night with some sleet.

Booth Day Unit

4/6/17.

Weather

Disastrous, cloudy, foggy,  
sea choppy - cold.

Heard this morning at breakfast  
that war was declared at 9:30 am.

- ① Test to determine noise of waves. Made from dock. Receiver #1, head 2" under trough of waves.

Without audion hear noise to

18.

- ② Same as 1 but with audion's hear noise to

60

This noise is a roar mixed with clicks of varying intensity.

- ③ Same as 1 but with receiver #2 at various depths. No audion.

Noise of waves.

Noise slight hear to

$\frac{1}{2}$  pole length 18"

8

16

At surface again

10

14

$\frac{1}{2}$  pole length 18"

18

$\frac{1}{2}$  pole length 36"

16

$\frac{1}{2}$  " " 4 1/2'

16

60



#2 Receiver Less sensitive  
than #1.  
Suggest a tube to equalize  
pressure.

2	face length	6'	12
2 1/2	"	7 1/2'	10
3	"	9'	12
4	"	12' nose changes here, can not hear the flow of water, but hear rather the dash of waves against dash	12
5	face length	15'	12
6	"	18'	10
7	"	21'	10
8	"	24' (on bottom)	10

11:35 Am.

Tug came in around point to  
land mine material.

Connected on audions with #2  
receiver. Could hear engines  
plainly at 500 yards. Could hear  
her slow down and then stop  
when for making landing at  
about this distance.

Did not hear propellers but  
could hear the pop or clack of  
engines as the pistons went  
up and down.

With audions in the noise is terrific without the receiver shunt boxes.

At 60 the smaller noises are strained out and only the wave dash against the piling can be heard.

It will be necessary to strain out extraneous elements.

Suggest N.E. Electrical Method.

④ Same as ③ but with audion connected up.

at surface noise to

1'	under surface	"	"	60
3'	"	"	"	60
6'	"	"	"	60
9'	"	"	"	60
12'	"	"	"	60
15'	"	"	"	60
18'	"	"	"	60
21'	"	"	"	60
24'	"	"	"	60
3'	"	"	"	60

not as loud

only little louder than at 24'

Pounding of waves against  
pier, rocks it and makes  
an awful sound.

4/7/17.

Weather - Stormy, cloudy in  
morning! Clear in  
afternoon heavy wind  
and rough sea all day.

On arrival back with rope, saving  
#3 rescuer's euv. and made  
preliminary noise test.

- ① Noises are - a continuous  
roar and intermittent scratching  
sound. The roar, I think is the  
combined noises of white caps,  
waves against piers, piles etc.  
The scratching, the motion of  
water in the funnel against  
the diaphragm.

Noise can last to

60.

- ② Without audion, using #3  
rescuer.

Noise - could not hear anything.

To make sure that there was  
nothing wrong with ②, connected

The air tube to #3 receiver has broken loose twice. For this work, it will be necessary to make all fittings, strong and rigid so as to stand the impact of the waves, and rough handling of swinging overboard.

~~#2 Receiver also has an oversized ring over the diaphragm which clamps it so tight that we can not remove.~~

~~Our facilities for repairs here are less than in the past. That parts should be designed to be readily repaired.~~

through with transmitter and receiver. Could hear through OK.

③ To test circuit of ②, drew #3 receiver up out of water and talked through it. Could hear both with direct circuit and through audions.

④ To test and see if audions were working well, connected a Bee receiver as transmitter in audion line. The high wind and dash of waves outside made a terrific noise over this. Speaking close was too loud to transmit. Speaking at 24" was as close as articulation could be distinguished. Seemed to show that audion circuit is OK and very sensitive.

⑤ Disassembled Receiver #3 to see if OK. Found Chatterton compound around air tube.

It is evident that theory of sound being only about 1/60 amplitude in water losses good.

We should therefore have transmitter which will give 60 times the electrical impulse as present air one.

This may possibly be accomplished by having a heavier diaphragm and adjusting much closer.

cracked, tube loose, diaphragm showing effects of electrolysis. Took apart, dried out and vaselined all iron parts and reassembled.

- ⑥ Tested out receiver #3 by taking in it. Found it ok, apparently louder than ⑤, both direct and with audions.
- ⑦ Let #3 receiver under water. Noise less than ①, sounds clearer & clearer.
- ⑧ Used transmitter #2 to receiver #3. Could hear clearly at 6' and at 50'.

4/8/17 Sunday

Weather - Morning - cool,  
cloudy rough.  
Afternoon, wind became  
less and sea calmed  
down so that we  
went out in boat.

Get row boat from coast  
guard.

Two guards volunteered and  
with Dawson went out.

Used Transmitter #2, Receiver

#3.

①	At	50 yards	heard plainly.
"		100 "	" "
"		200 "	" "
"		500 "	" "
"		750 "	" "
"		850 "	not sure
"		1000 "	could not
			distinguish.

The slap of spars is so like the  
clanking of the bell that it is  
difficult to distinguish.

Transmitter #3 is evidently very weak as compared with #2. It sounds too much like the general noises. So not distinctive enough.

② Using transmitter #3 receiver #3.  
 at 50 yds. could not hear  
 Back to 1 yard. Hear plainly  
 at 10 " Hear  
 at 20 " Just Hear  
 at 30 " Could Hear

③ I went out in boat and pounded heel, 3 taps - 1 second interval & 3 more. Dawson listened.

100 yds	heard
200 "	"
300 "	"
500 "	"
600 "	"
750 "	"
900 "	"
1000 "	"
1200 "	"
1400 "	"
1500 "	"

Signalled me to come in because I was getting near strong current which would carry me to the reefs.

- ④ Feed break wheel in input circuit. Noises come with it making it prominent. Also the air gap break outside booth makes so much noise it disturbs readings inside booth.



4/9/17.

Weather - Very cold - Fair -  
1 High tides - Rough sea  
all day.

Sealed map to locate distance  
points in testing.

- ① Dawson Moore went out in  
boat taking transmitter #2.

Used Receiver #2.

Noise of waves so loud  
could not distinguish at 100 yds.  
Wind so high & waves so rough  
could not stay out.

---

Notes. 4/14/17

4/14/17.  
Weather - clear, mild, very little sea.

Position - off Red Bank, in H. Shrewsbury Co.

Using - Transmitter #2 (E<sup>o</sup> Bee).  
 Receiver #3 with Tunnel.  
 Depth of water at Receiving  
 boat 8 ft.

① Position Trans. Boat (Red Bank)  
 Depth water 2 1/2 ft.  
 Distance from Receiver 700 yds.  
 Near to Near plain

② Position (Position Boat H.  
 But. Middle Creek)  
 Depth 10 ft.  
 Distance 1575 yds.  
 Near to Could not hear

③ Position  
 Depth  
 Distance  
 Near to

1750  
 700

1700  
 1575

4/7/17.

Same as previous page except  
now heat used to get small intervals.

③ Low  
High

60  
60  
100 yds  
9'

④ Low  
High

50  
60  
250 yds  
9'

⑤ Low  
High

46  
60  
350  
10'

⑥ Low  
High

40  
60  
450  
9'

Can hear launch going  
away for about 300 yards.

Rope noise prominent. must  
find a better means of  
suspension.

⑦ Low  
High

32  
58  
600  
12'

⑧ Low (and coming up getting  
High choppy out)

12  
40  
700  
21'

⑨ Low (S & M ind.) Turned back  
High choppy out

6  
30  
800  
18

⑩ Low  
High

4  
16  
1,000  
15

⑦ Low  
High

Can only occasionally hear  
" " " low at 10  
1200  
18

4/15/16.

Because of short distance readings yesterday, as day was fair with only slight wind, decided to make readings in the bay from Atlantic Highlands pier towards Port Hancock wharf to day.

Found moderate N.W. wind producing more waves than anticipated.

Depth out lost. Sea too high.

Came in on wave for buoy at Red Bank.

⑬ Low  
High

56  
60

⑭ Low } Lost this reading. Rains  
High }  
Boat had gotten over into shallow water so that reading was practically lost.

# Notes —

① Can not hear behind  
banks

② Probably a pair of good head  
telephones required. Be better with  
this outfit than single head  
phone. As it would be more  
sensitive & cut off other ear

⑮ Back to 100 yds in advance

① Low  
② High

60  
60  
100 yds  
80'

⑯ Low  
High

60  
60  
200 yds  
15'

⑰ Low  
High

48  
60  
300 yds  
14'

⑱ Low  
High *Wind*

20  
36  
400 yds  
14'

Break NW  
Side of Horn

① Low High wind comes up making noise above & below water

10  
36  
500 yds  
18' 6"

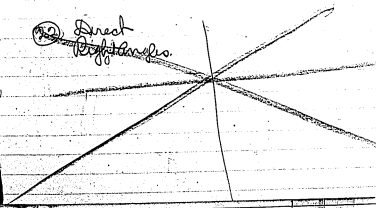
② Low High slight wind much noise

0  
14  
600 yds  
11'

③ Direct  
Right angles

40  
42

④ Direct  
Right angles





## Tests to make

- A. Distance
  1. Outside in bay
  2. Off Red Buoy
  3. From Point
 to determine effect of depth of water.
- B. Distance can hear with horn pointing at source of sound and sideways to source to determine effectiveness of horn as a direction finder.
- C. Test relative loudness of Transmitters 1, 2, and 3.
- D. Make up buoy and anchor to try leaving #3 horn outside and away from boat to eliminate noise

4/16/17.

- A. Dred stern of tender out of water & packed stuffing box.
- B. Put new dry batteries in tender.
- C. Exchanged wheels in audions. This set seems to be quite sensitive.

Moderate N.W. wind made river choppy. Ran over to cove on opposite side of river to get short distance readings and to test out sensitiveness of audions.

Transmitter # 3

Receiver # 3 with funnel

②	25 yds	60
	Low	60
	High	
③	35 yds	60
	Low	60
	High	

25 100 30  
During previous reading wind  
was quiet. Dropped down to 100  
yds but wind had puffed up.  
Could not hear.

Noise is a great factor in the  
game.

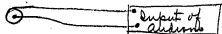
(24) Let Row boat drift out  
carrying #3 transmitter.  
Could hear to about 75 yds,  
Could not distinguish beyond  
this.

(25) Then sent out row boat on  
end of line to 55 yds. Found  
that by interchanging buelks  
1 and 2 on audions could get  
sound a little clearer & cleaner

(26) A Connected up break wheel  
in input circuit, having #3  
transmitter and funnel connected  
in



On running break wheel, got very great noise, too much for use.  
B Then took out #3 horn, running only break wheel in input circuit,



Still got noise from this.

C. Then changed from lead covered input, as advised by M.E. Co to straight twisted pair as previously used in Lab. On connecting up and running as B, got no noise from break wheel. This noise was evidently obtained by alternate charge & discharge of the sheath.

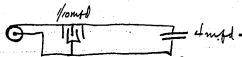
D Then put lead sheath input back on, and grounded the sheath. ~~Diminished noise only slightly.~~

It is evident that when break wheel is used on one side of line as in this case, lead covered wire

can not be used as input in  
spite of T.E. Co's advice on this.

- E. Found results in C and D to be  
mistaken - reason being that the  
input wire substituted for  
lead sheathed input was  
short circuited. On using  
well insulated pair, the break  
makes considerable noise  
with regular twisted pair,  
not quite as much as  
with lead covered however.

- F. Added 4 mfd condensers  
around  $\frac{1}{10}$  mfd. at present  
around break



This reduced the noise of the  
break slightly.

27. Using #3 Reserver with  
 funnel and with break  
 wheel using air break,  
 ran tender Boston Steam  
 directly away from horn.  
 Could not distinguish  
 propeller noise from  
 other sounds and noises  
 coming from wheel horn.  
 On remaining break could  
 hear chug, chug of engine  
 for about 200 yards.

28. Experiment to compare  
 bells 1 and 2.  
 at 500 yds. - Low  
 Hear #1 to 32  
 " #2 to 38

29. Same as 28 but to  
 yards  
 Hear #1 to 28  
 " #2 to 34

30 Same as 29 but to yds  
 Out #1 to 18  
 " #2 to 28

31 Same as 30 but to yds  
 Out #1 to 2  
 Out #2 to Low 6  
 " " 2 " High 14

32 Test of horn painted  
 direct and at right  
 angles.  
 600 yds.  
 #2 Transmitter  
 #3 Receiver with funnel  
 Direct at 50  
 Right angles 50

4/17/17.

Beautiful day without wind or waves.

Took readings about 150 yds off pier at Sandy Hook.

Used Transmitter #2. (Range E & Buel)

Receiver #3 with Funnel

(32) A Distance (250) (150)

Low

60

High

60

Hear overtones of bell both close up and at this reading.

(34) B Distance (500) (1700)

Low

60

High

60

Hear the engine & propeller of a tug both on "Low and High", more than a mile away.

Get readings  
with thicker diaphragm  
#3, with and without  
funnel.

(35)<sup>c</sup> Distance 900 (1700)  
Low 54  
High 60  
still hear tug though she is  
at busy off Lynn Kroll  
3500 yds away.

(36)<sup>a</sup> Distance 1400 (2000)  
Low 40  
High 52  
Can not hear tug on low  
but can still hear on high  
although she is out of  
sight around Sandy Hook  
point.

(37)<sup>E</sup> Distance 1800 (2250)  
Low 28  
High 44  
Tug and all regular sounds  
now lost. Only noise is roar  
of Hudsons. The ideal day  
for work.



38 F. Distance (2700) (2100)  
Low  
High

18  
38

39 A Distance 2600 (2100)  
Low  
High

20

did not get

(mistook signals and had to stop)

S.W. breeze started up here. ~~Dark~~  
Sea like glass before.

Sea picked up before S.W.  
Breeze.

Ran in to Red Bank  
and anchored near  
Red Buoy.

Made tests of comparative  
values with recorder # 3,  
funnel off and on.

(40) Transmitter # 2. Large <sup>ED</sup> Bell

100 yards  
With funnel low 60 high 60  
Without " " 38 " 60

200 yards  
With funnel low 28 high 44  
Without " " 30 " 52

300 yards  
With funnel low 22 high 38  
Without " " 16 " 34

Repeated experiments

100 yards  
With funnel low 54 high 60  
Without " " 18 " 36

200 yards  
With funnel low 42 " 54  
Without " " 4 " 22

300 yards  
With funnel low 24 " 42  
Without " " 0 " 6

↑  
Can not determine

4/18/17.

On arrival back from Orange, the weather being fine, went out and anchored off N.J.C. Pier in Sandy Hook Bay.

Made series of tests to find relative loudness of #3 Receiver pointed direct at source of sound and at 90° from it.

These tests proved unreliable. Reason later found to be that the second switch was on "low" in place of high and all readings were too low.

Made also series of tests to find comparative values of #1 & #2 transmitters with same results.

During this time the wind had come up making the bay somewhat rough.

Late in afternoon made following tests:

Tests to determine relative values of #3 Receiver with tunnel pointed directly at source of sound (#2 Bee) and pointed 90° from direction of source

(41)		500 yards.	
Pointed at Source	{	Low	60
		High	60
		90°	46
90°	{	Low	60
		High	34
		800 yards.	58
Pointed at Source	{	Low	24
		High	50
		90°	22
90°	{	Low	36
		High	equal not distinguished
		1200 yards	cannot not distinguish
Pointed at Source	{	Low	
		High	
		90°	
90°	{	Low	
		High	

2000 yards

Painted at source { Low <sup>could not</sup>  
High <sup>distinguish</sup> "

Since this was the limit, did not try 90°.

This test not thoroughly satisfactory because boat was rocking badly & noisy.

Reason was she was anchored broadside to the wind and waves.

{1113}

4/19/17

Yesterday's results confusing, not reliable. Determined to try over today.

Rained until last night. Started down river in S.W. blow but found it rather quiet at Ft. Hancock River, anchored about 150 yds. 11 o'clock from this.

(H2) Transmitter #2

Receiver #3 with funnel

A = 500

Direct	{ Low	60
	{ High	60
90°	{ Low	54
	{ High	60

B = 1000

Direct	{ Low	52
	{ High	60
	{ Low	44
90°	{ High	60

$$C = 1500$$

Direct { Low  
High  
90° { Low  
High

54  
60  
41  
60

Can hear launch engine at this distance.

$$D = 7000$$

Direct { Low  
High  
90° { Low  
High

36  
58  
36  
56

$$E = \text{Brayton Landing mission 9 June}$$

Direct { Low  
High  
90° { Low  
High

24  
46  
24  
50

$$F =$$

Direct { Low  
High  
90° { Low  
High

can not distinguish  
at all.

Test for difference with funnel.  
Transmitter #1.  
Receiver #3 - without funnel.

(43)

A = 500 yds  
Low

26

B = 1000  
Low

10

C = 1300 yds  
Low

2. Limit

Put funnel on.

C = 1300  
Low

4

Very much more noisy.  
Side running strong now makes  
how noisy. I think this  
figure is correct. However,



To confirm previous

Transmitter #1

Receives #3 with funnel.

A = 500 yds  
Low

16

B = 1000 yds (less than A)  
Low

14  
14

C = 1500 yds  
Low

Limit

14

Funnel off

C = 1500 yds  
Low

2

B = 1000 yds (less than A)  
Low

12  
12

A = 500 yds  
Low

12

4/20/17-

Assembled small dinner  
bowl (Transmitter #4) for  
short distance use.

Ran to Sandy Hook to take  
readings.

Saw Capt. Bettison who  
referred me to Capt. Berry  
about position for making  
deep water tests outside  
hook.

Got message from Irwin to  
come back to Red Bank  
immediately.

Message at Red Bank.  
Father unconscious & very low.

4/18/17.

Returned last night from  
Montgomery to Orange & got  
to Red Bank this morning.  
Saw Dawson Taylor, found  
that Tripes had been finished,  
went out to try it out.

Weather Fair. Fair wind from  
N.W. Rather heavy swells in bay.

Used -  
Transmitter #2 - F<sup>b</sup> Bee  
Receiver #3 with funnel, mounted  
on tripod. Ranged to bottom about  
50 yards from launch.

### Readings

(H/L) A = 600 yards.

Low 60

High 60

Hard Launch on low easily to B.

B = 1200 yds

Low 60

High 60

Heard our tender to position C.  
High powered motor boats came  
by. Could hear to about 1500 yds  
at right angles to horn.

C = 1300 yards.  
Low 56  
High 60

Tramp Steamer came in from  
Ocean. Could hear engines easily  
to 4000 yards. They gave the  
sound - - - - -

D = 3000 yards.

Mistakes in signals and  
constant interference by  
a tug, two paddle wheel  
Steamers and a power sail  
boat made this reading  
impossible.

We have two difficulties  
to contend with & need to overcome

① means of finding true  
distance or range.

② need of apparatus & method  
of signalling for 3000 yds. or more.

- NOTE -

Discrepancies between Dawson readings and mine may be because of use of different bells. Dawson took angle and effect of funnel readings with #1 small dinner bell. I took readings with #2 large bell.

It is also evident that for quantitative readings, the sensitiveness of apparatus is largely influenced by the current flowing through the filaments. We have not been careful in the past of this.

4/30/17

Weather - Calm, blustery, high wind from S.E. - Boat rocks. Could not use horn from boom in such weather.

Transmitter #2 (E<sup>o</sup> Bell)  
Receiver #3 with funnel anchored 50 yds from boat on tripod

(45) A = Low 60  
High 60

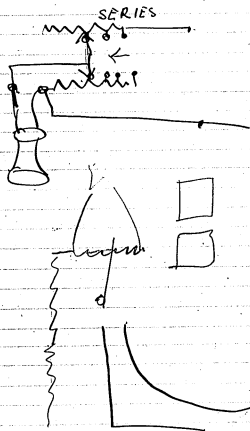
I can not hear launch at position B today though I could Saturday.

B = { Low 28  
High 48

Chew a tug - also Borden Right  
fanned boat. Disturbs readings.



RECEIVER - SHUNT



Bomb dropping test included  
so much decided to move up  
lay opposite points.

Transmitter #1 (See since B<sup>7</sup>)  
Receiver #2 with funnel - from boom

(46)	A		
	Straight	Low	24
		High	46
		Low	14
	90°	High	52

		Repeated above	
	Straight	Low	26
		High	54
		Low	26
	90°	High	46

Dawson Reading on same.

Straight { Low 38  
          { High 40

90° { Low 18 (24)  
      { High 36

Took second time

Straight { Low 38  
          { High 54

90° { Low 26  
      { High 50



Then tried effect with &  
~~without~~ funnel -

(H7) 1500 yards  
Transmitter #1 (RT Rec)  
Receiver #3.

With funnel hear to  
Low 32  
High 52

Without funnel hear to  
Low 14  
High 34

### Order from Orange

4 Hard Rubber Blocks  
having 2 Fahnestock connectors  
each.

1 box each size double  
pointed tacks

### Suggestions & Notes on Apparatus

- ① Trouble from water in back of diaphragm largely if not entirely removed by new large tube at bottom and small orifice above.  
Suggest that this tube be well vaselined to prevent capillary.
- ② Suggest that all parts be well vaselined in sending out, especially iron or steel. This will prevent rust and water staying in.
- ③ Suggest large bush with thin rubber diaphragm to prevent water getting in back of diaphragm and at the same time equalize the pressure.

A	B	C	D	E
1	2	Repeat 3	4	5
F	G	H	I	J
6	7	8	9	0
K	L	M	N	O
P	Q	R	S	T
U	V	W	X	Y
Z	Num	Interval		
	X	X		
Sending				

A	B	C	D	E
1	2	3	4	5
F	G	H	I	J
6	7	8	9	0
K	L	M	N	O
P	Q	R	S	T
U	V	W	X	Y
Z	Num	Interval		
	X	X		
Receiving				

**Notebook Series -- Notebooks by Experimenters Other Than Edison  
Navy and Wartime Research Experiments -- A. M. Kennedy Books  
Notebook, N-17-04-01**

This notebook was used by Absalom M. Kennedy in May and August 1917 for notes on experimental work for the U.S. Navy performed under the direction of Edison during World War I. The entries from May relate to the procurement of a boat at Cold Spring Harbor, Long Island, setting it up for experimental work at Sandy Hook, New Jersey, and performing receiver and transmitter experiments. The entries from August pertain to experiments on the submarine detector. Included are details of trips to Sag Harbor, Long Island, to listen to torpedoes being fired at Bliss Proving Ground and other locations. The Bliss entries bear brief notations by Edison. The notes indicate that Jerry T. Chesler, E. Rowland Dawson, John A. Hanley, and Sherwood T. (Sam) Moore also worked on these experiments. The front cover is labeled "Experiments. #4. From May 1 to 1917." The pages are unnumbered. Approximately 110 pages have been used.

May 1, 1917.

Weather - Raining. High sun,  
blowing gale.

Ran down to Highlands. Found  
wind as high and as engine  
was skipping, ran back to  
Red Bank, agreeing to pay Andy  
\$8.33 for day.

- ① Had Taylor fix #4 transmitter.  
(Small Dinner Bee) with heavy  
gravity clapper.
- ② Tested storage batteries, showing  
Dawson method and results.  
Found one discharged.
- ③ Tested lead covered cable as  
input against regular  
rubber covered wire. Found  
no difference.
- ④ Made arrangements with  
Drum to store extra material  
and for use of leather and

bench.

- ⑤ Went over audions and showed Dawson effects of amount of filament current.

May 2, 1917.

Beautiful clear morning.

- ① Had Andy run tender off dock to get photographs of waves. Sun low & in good position but am afraid that the other (wind) waves interfere.

River very calm at Highlands. On entering bay, met by strong N.W. gale, throwing up heavy sea with white caps.

Anchored off breakwater. Wind increased. Started back up river to get readings.

Found water calm though high tide running between Highlands and mouth of Hanesink River. Anchored to by effect of diaphragm.

As this tide would interfere with boom work, decided to try experiments with different thicknesses of diaphragms.

First tried using #3 Transmitter with horn from boom. Tide made this so noisy decided it was impractical.

Then tried mounting #3 Transmitter with horn on tripod. Noise proved intermittent, at times perfectly quiet and then noisy.

Started out to find source of noise and located in ropes and cable touching or hitting the funnel.

With care to avoid this the transmitter was quiet.

Being at anchor between Bridge to Highlands and the mouth of the Navasink River, about 700 yds from mouth made tests of diaphragms



(48) Transmitter #4  
 (Small Denny's Reel)  
 Receiver #3 with horn, on  
 tripod.  
 Distance 300 yards

.010" diaphragm { Low 18  
 High 34

.020" diaphragm { Low 28  
 High 50

.032" diaphragm { Low 24  
 High 38

Steamers came by and as the  
 channel here is narrow, we  
 had to move out of the way.

Came up to Red Bank and  
 repeated experiment

Distance 100 yards

.032" diaphragm  
 .020" "  
 .010" "

Low  
 8  
 26  
 12

May 3, 1917.

Weather. Fair. High next morn.  
 Ran to Highlands to take  
 diaphragm thickness  
 readings.

Launched #3 Resum from boom.

(149)

	meas.	Row - High
.010	none 48	16 - 38
.015"	" 42	24 - 50
.020"	" 42	42 - 60
.025"	" 30	32 - 48
.032"	" 46	28 - 40
.040"	" 24	12 - 26
.063"	" 22	12 - 20

May 11, 1917.

Weather - Morning - fair -  
high N.W. winds  
Afternoon - cloudy.  
wind moderated some.

On account of high wind, went  
to Highlands to take readings.

On first arrival, tide was so  
swift as to make noises  
too great for readings.

Got reliable readings on turn  
of tide, about 12:30 P.M.

Found A battery low

voltage and on test found

1 cell 1.25 V.	4 cells 4.80	7 cells 3.80
2 cells 2.50	5 " 4.50	8 " 4.90
3 " 3.75	6 " 4.20	9 " 5.80
		10 " 6.60

proving that cells 5, 6, & 7 were  
reversed.

Cut these out and with cells  
1, 2, 3, 4, 8, 9, 10 in circuit got 9  
volts.

During turn of tide made  
tests of mica diaphragms  
with iron centers against  
standard Bell diaphragms.

(50)

Transmitter #4 (Purcell-Dimmer Bell)  
Receiver #2 (Bell receiver with tube)  
Distance about 100 yards.

A Regular Bell Diaphragm.  
Heard to 52

B Mica Diaphragm .005 thick,  
with iron disc  $\frac{3}{4}$ " diam x .005"  
on center. Disc on opposite  
side of diaphragm from  
magnets.  
Heard to 60

C. Attempted to reverse so that  
disc would be on magnet  
side of diaphragm but  
disc pulled away from  
diaphragm.

C- Mica diaphragm .0055"  
thick. Iron disc .013" x  $\frac{3}{4}$ ".  
Disc on opposite side  
of diaphragm from  
magneto.  
I tried to

54.

Attempted to take reading  
with disc on same side  
of diaphragm as magneto.  
The magneto seized the  
disc.

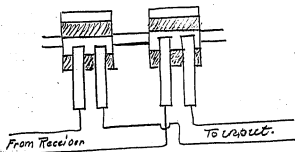
D- Mica diaphragm .011" thick  
with soft iron disc .005"  
thick x  $\frac{3}{4}$ " diameter.  
Disc on opposite side of  
diaphragm from magneto.  
I tried to

20

By this time the tide had  
turned and was running so  
swiftly as to make reading  
impossible from noise  
made with receivers.

Tried out new break wheel  
~~to~~ see if less noisy than  
former.

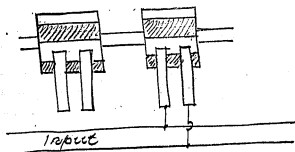
1st connected in usual  
manner.



Found loud ringing periodic  
note, whose pitch was not  
varied by changing speed  
of motor.

Found that when brushes  
were left on insulated bar,  
that is when input was  
open had same ringing  
noise when motor was  
stopped.

Changed to following  
connection so that input  
would not be open -



Break still noisy but now  
the pitch of noise varied with  
speed of the motor.

This noise is too great  
to permit break being used  
in input circuit.

5/5/17.

Arrived Cold Spring Harbor about 10 o'clock.

Spencer had told Nelson to call him up at 11 am. Called up and reported clutch trouble.

Decided to take Engineers from Cold Spring Harbor to run engine until we got through Hell Gate and into the Upper Bay.

Left about noon.

Had difficulty with clutch in getting away. If the reverse was adjusted tight enough to hold the forward would bind.

Finally adjusted so that the reverse was loose. Went until off Matinecock Point when engine began showing trouble which continued until we got off Light House at Execution Rocks. Here she stopped dead and we had to anchor to avoid being blown on the rocks. (N.W. Wind)

After about an hour we



Finally get off here. Tried to  
make City Island. Engine has,  
stopping repeatedly. Finally  
refusing to run at all. About  
8 PM. anchored 500 or 600 yds  
S. of Sleeping Stones  
light in heavy blow and  
heavy sea.

Nelson and Engineer examined  
engine and found water in  
#3, 2, 3 & 4 cylinders.

Determined to run to  
City Island, mess yard, in  
morning get new dry batteries  
and get in communication.

If engine works OK. try and  
pull on through to Highlands. If  
engine shows up bad, phone  
Spencer & have her fixed up  
at City Island.

22 6/10/17

5/16/17.

Get engine straightened out and  
ran for City Island. Got 6  
dry cells and sent telegrams to  
Mr. Meadmore from Dawson  
and telephoned Mr. Spencer's office.

Ran OK until we got past  
above Manhattan Bridge. Picked  
out and had to tie to a barge  
at Pier #40.

Found Spark Plugs dirty. Cleaned  
them. Got away about noon.

By compass laid course about  
5 degrees east of South and  
made Sandy Hook point  
without trouble.

Stopped half way up the  
bay to clean spark plugs. Engine  
skipped and stopped half  
a dozen times, just getting  
us through the bridge at  
Highlands.

Tide carried us to mouth  
of Narauink River.

In trying to start engine,  
she back fired, and sheared

the guy holding the starting  
pickets

Rowed to Highlands and  
telephoned Drumm to send  
Andy and launch to tow us  
in. He arrived about 9:15  
and towed us to Res-Bank  
by 10:30.

5/17/17.

Went in to see Irwin. Spencer had telephoned him to repair engine and clutch.

Got Dawson aboard. Discussed location of sound proof booth. Decided to use the small state room for the purpose. Measured this and Dawson sketched out Booth to fit. Went him on to Orange to cut it out.

Got Irwin aboard to examine engine. He reported cylinder rings leaking, valves clicking, clutch dog bent, ignition system poor, exhaust pipe needs replacement. Telephoned Buffalo Engine people who could not send man. Telephoned Spencer who will come down tomorrow. Telephoned Dry Dock to arrange to take her out.

Towed boat to dock. Planned to buy tripod to lift engines and have them out.

for repair tomorrow.

5/18/19.

Inuin & Andy early on job. Hot engines disconnected from oil pipes etc. and with frame & chain block hoisted up on deck. Found valves seated poorly. Little or no knock in bearings. Piston rings in good shape.

Spencer came about 1 P.M. and agreed to the work being done. Also agreed to sending her to Keyport to be hauled out and painted.

Left Dawson with host and went to Orange to see about Bost and about small generating plants for charging the storage batteries.

5/19/17.

Found trouble with under-water  
box at Orange, top and sides  
warped so that the sunbows and  
top plate could not be fastened.  
Let Ford Truck and sent it  
with Taylor to McCabe Co.  
manufacturers to have straightened  
out.

Went over to Storage Battery  
to Navy Lighting Dept. Found  
that they had a small generating  
set (Diesel) which would fit  
our purpose. They offered to loan  
it to us but Mr. T did buy it.  
Asked them to express it to Red  
Bank to arrive Tuesday or  
Wednesday.

From Mudd found that parts  
of Booth moved he shipped  
Monday and that Jeff and the  
carpenters moved he down  
Tuesday to put it together and  
on boat Wednesday.

Got back to Red Bank in  
afternoon.

5/20/17.

Got Kingsland on board to work on engine.

Andy started towing us to Keyport to be hauled out about 10:30 a.m.

Got along O.K. until between Point Comfort and Levelard, we ran aground. Got off in about 30 minutes.

Ran into rain storm between Point Comfort and Conesboro Point. Lasted only about 15 minutes.

Got to Keyport and anchored about 4:30 P.M.

Airplane started out from school. Flies about 5 miles and dropped in sea. Was towed in.

Gerry reports can not haul us out until Tuesday morning as he has the Oeking on ways which will not be off until that time.



5/21/17. - Monday

Went to Orange this morning. Found that Taylor had not got the iron box from McCabe but that he was going to inspect and see if ok. in afternoon.

Had to get bottle of storage battery solution. Had to get car to catch 4:54 train. Ray just got bottle to me as I was stepping on car.

On arrival at Keyport, found that Drumm had been telephoning about material which had arrived.

5/22/17

Went to Red Bank to see Druein about material. Found the saw-hair felt and lumber for boat there.

On arrival back at Keyport found that in drawing boat up on ways the rollers slipped off to port side so that the boat was jammed and when tide ran out could not go up or down.

Telephoned Mr. Spenser, Mr. Meadowcroft and to Druein.

Terry was apparently at sea and did not know what to do.

Druein came down about 8 P.M. Decided to draw her off at next high tide (about 9 P.M.) by reversing the ways and by line from bow to a large barge. Prepare ways tomorrow and pull her on again Thursday morning. In this way she will not get off again until Saturday morning.

Also planned with Druein to send felt and lumber over by

truck so that Mudd's men may work on hoath while boat is on ways and enroute to Newark.

Dawson went to Orange in afternoon.

Captain notified me this morning that he requested quit that night, saying that he saw the boat was going to give trouble and he wanted to get away from it.

Quitted with him as follows:

11 days wages @ 100 <sup>00</sup> per mo	36.67
Advanced John	3.95
Advanced Cook	1.50
Telephone to Spencer	.35
	<u>\$42.47</u>

Quit following information from him:

Name - Chas. A. Wilson

Address - 634 Lexington Ave, N.Y.C.

Age - 33

Nationality - Finland.

1st Papers - About 6 yrs ago

2nd Papers - not yet out.

I am glad that he quit.  
Believe he is a good navigator

but he thought much more of  
the dignity of his job than of  
the work.

Terry got Yankee III located  
about 8:45 P.M. Feed him alongside  
dock for the night.

5/23/7.

As sloop was coming in to ways close to us, anchored Yankee III off dock.

Cook did not return last night. Suspect he will quit with the Captain.

Saw Perry about pulling Yankee III out again. He planned examining his ways today at low tide, and fixing them tomorrow and hauling us out tomorrow night. Got Dravin on phone who got Perry to hurry up and pull us out tomorrow morning. Arranged with Jim to bring the Tender down tomorrow morning. Hope the weather is good so he can make it all right.

Russland having trouble pulling off the fly wheel. Says he started it but she does not come farther.

Terry now tells me that he can  
not haul until tomorrow night.  
That he must float his piers  
and get them on the tracks on  
high water tonight. Lower them  
a place on low tide tomorrow  
and pull us out at high tide  
tomorrow night.

Spencer came and saw boat  
that she was not damaged. Got  
him to go back by Red Bank to  
push Drury up.

Tacked to Kingsland about  
Captains job. Spencer will go  
to Newark with us and if  
satisfied with Kingsland will  
take him at \$100 per month.

Telephoned Mudd about the  
carpenters. Promised to send them  
down tomorrow morning.

5/24/17.

Trouble with pulling off fly wheel. Broke puller. Went over to Tilton & Cherry - wagon works to have them make new one. They loaned me one which was little too small. Had them make attachment so it would draw wheel from two holes already in it.

Telephoned Duran. He could not come over this morning but would try this afternoon. 1 P.M. Carpenters have not yet arrived.

1:30 P.M. Carpenters arrived. Began work on bench.

Saw Terry who tells me that he can not pull out at night.

Got fly wheel off O.K. Pulled key with it and stuck the whole way.

Telephoned Duran size of key  $1\frac{1}{2} \times \frac{1}{2} \times 5\frac{1}{2}$  to have new one made.

5/5/17.

Drum came over early - 6 am.

Got Fly wheel on with starting

Washed pump & key.

Revised engine.

Brought over spare petrol plug.

Got engine started.

Adjusted clutch so that would

lock forward and backward.

Bound slightly on back however

and had to loosen up.

Derry will not haul us on

apparent high N.W. wind.

Told Drum that unless we could

go to Newark Sunday morning,

he could not haul us at all.

Kingsland wants 3/4 x 1/2 bottoming

tap and reamer. Could not find

in Keyport (4 stores). Spent twice

to telephone Drum for it but he

did not answer phone.

Got 3 wet batteries & Batteries

aboard from Andy's boat.

Went to Orange to get bottoming

tap & money and also beginning

to run photo.



New transmitter not finished.  
"miniature Submarine" not finished

5/26/17.

Caught early train (8:27) back. Saw Perry who could not promise to get us off ways before Tuesday or Wednesday if we went on. Told him we could not go on as we had to get off Sunday. He promised to hold ways for us on notice any time we could come back.

Telephoned Drumm several times about clutch. Had band made to go around & draw up on it to prevent breaks & spreading. Just too full to clear housing.

Telephoned Standard Oil Co at Matawan for gasoline.

Could not tell when it would come. At last, about 11:30 telephoned and it had not started yet. Cancelled and after trying garage, finally by hauling in trailer, for saw, finally got from Kipp's Yacht Club.

Pope, oil shipping from Drumm's arrived about 8:30 PM. so we

hauled out to anchor ready to  
get away in the morning.

Spencer came at noon. Saw  
situation. Packed with Dr. in our  
phone.

Determined to hold to plan to  
make Newark by leaving early  
Sunday morning to take Andy's  
boat along for safety.

5/27/17.

Up early. Got away from  
Keyport 8-8:30. Engine blew  
out gaskets in about a mile and  
Andy took us in tow alongside.

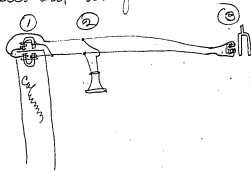
Got engine running again but  
blew out another gasket.

Made across the Raritan Bay  
and up Arthur Kill on tow  
O.K. Past 3 bridges, Ran  
around just before Hts.  
Got engine going to pull out.  
Long waits at Turnpike & P.R.R.  
bridges.

8/4/17.

Amely brought down and set up resonance column.

Tested out as follows



- 1 = Balanced Receiver (Regular Diaphragm)
- 2 = Bell Receiver to compare with column
- 3 = Magneto phone 290 fork & watch case receiver, fork tapped by hand.

①  
Tested Column against Bell Receiver and adjusted until when tuned to 23.6 (in column) the sound of fork could not be heard in receiver and could be distinctly heard in ear tubes. Proving OK.

8/4/17

(2)

Then replaced #3 with receiver #3 and used B<sup>7</sup> Bell (#2) as transmitter.

Could be heard distinctly in (2) (Bell Phone) but could not be tuned for and heard in tube.

---

(3)

Same as #2 but used E<sup>6</sup> Bell Transmitter #2 in place of B<sup>7</sup> Bell. Could tune for in tube and hear at 14.5 very faintly. Could hear loud in Bell Telephone (2).

---

(4)

Replaced (3) Receiver #3 with Bell Telephone and placed 8" from E<sup>6</sup> Bell IV. A/R.

Could be heard plainly in Bell Telephone.

Could hear note faintly at 24½. By tuning could hear tips of clapper at 12-18-24-36.

Reason that fork could be heard better than bell probably because the fork gives a pure musical note while a bell gives a stroke with a series of non multiple overtones and can not be tuned for as readily.

Now, we knew what a submarine really sounded like - whether the gyroscope - the commutator - shaft vibration or the propeller made the most noise so that we could go after the right one and try and get it.

8/5/17.

Sunday.

Handy went to Orange last night to get adapter ring to fit large, movable coil receiver to reconvoice tubes and returned this afternoon.

The mice go out in Bay tomorrow and try out.



8/6/17.

Got provisions & ice aboard.

Ran out in Bay and anchored  
about 1 mile due east of  
Sandy Hook light. Position  
indicated by Mr. Edison  
when down).

Rigged up the crab to anchor  
horn on bottom so as to  
avoid rope sounds.

Weather overcast. Slight breeze  
from S. E. Increasing.

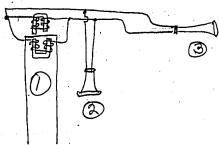
Preliminary

1. Tested out resonance tube with  
tuning fork O.K.
2. Tested horn circuit to tube  
with E<sup>+</sup> Bell. Could not tune  
for. (Confirms previous experience)
3. Used 290° fork, touching horn (17)

8/6/17

to test horn circuit. Proved OK  
and when tuned to 23.6 louder  
than Bell Telephone.

Used Booth with top off. No  
Booth noises interfere.



1 = Resonance tube with balanced  
receivers

2 = Bell Receiver

3 = Horn Receiver # 3.

Transmitter = Bell E<sup>b</sup> # 2.

(5)

Unshored #3 about 30 yds from  
Pumpant

Sounded Transmitter #3 about  
30 yds away. Could not hear

1.2) 45.5.  
98.5

28.

26.  
19.  
14.  
6.5

either with resonator #7 or  
with column #1.

(6)

Battery OK - 1.3 amp  
130 volts.

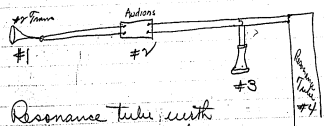
Above experiment being a failure  
connected up audions. With  
Beel at about 100 yds could hear  
on J.

Low to 26  
High to 38

This is low sensitivity and  
the audions show too much  
crackle noises; will have to  
be looked after.  
Wind up or blowing with caps

(7)

then connected the resonance tube  
with audions, as shown



Resonance tube with  
balanced diaphragm.

Used E<sup>b</sup> Bell as transmitter.  
Could hear to 32.38 with  
audions and receiver.  
Could not distinguish with resonance  
tube at any tuning.  
The popping & crackling noises  
which were prominent in  
receiver were more prominent  
in resonance tube and could not  
be tuned out.

(8)

Tested to find whether these  
crackles were in audions or  
in input circuit. Found that  
audions worked OK and crackles  
were in input circuit.

(9)

Used Bell Receiver in place of  
#1 and tested resonance tube  
against receiver. Used 370V  
tuning fork to excite.

Sound louder in tube than in  
receiver but could not be tuned  
out. Slightly louder at 13.6 - 20.5

and 36. - This seems to show  
~~that the tube can tune out~~  
low sounds but not those  
amplified by the eardrums.

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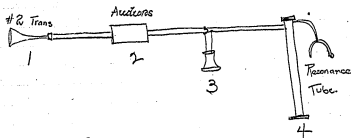
Took in Receiver #7 and found  
one wire broken.  
This accounts for crackles  
and for lack of sensitiveness.

---

3/7/17.

Weather beautiful. Slight breeze making just a ripple on the sea.

As results yesterday were false, due to broken wire from receiver to input, duplicated these experiments to make exact.



Used Balanced Diaphragm on resonance tube.  
Used E<sup>b</sup> Bell (#2 Transmitter) for signals.  
Anchored this about 30 yds from boat on tripod.

(10)  
Distance 100 yards. Could hear  
with audions  
Low 60  
High 60

Audions working fine. On account  
of smooth feed, very little  
noise - no crackles as yesterday.  
Demo as sensitive as on first  
tests.

(11)  
Then listened in with resonance  
tube H. Found not as loud  
as with reamers.

Tried tuning out sound and  
could not. Practically as  
loud at all lengths of air  
column. Sound of bell just  
a little clearer at 22. Which  
about corresponds to fundamental  
note of bell.

(12)  
Distance 600 yards  
Low to 60  
High to 60

(13)

Could hear at all points on resonance tube. Could not tune out. Trifle clearer at 22.

(14)

Distance 1000 yards.  
Readings not clear on account of boats running around. Two government boats and about a dozen small fishing launches churning around. Boat also surging and tightening up on lead line and made noisy.

Had to get train for Orange so left at 4:30.

Seeing boats running around Stanley fancied he turned out well once but not sure.

Will go out in middle of bay where fewer boats are on next attempt.



8/8/17.

Orders from Mr. E to proceed to  
Jagg Harbor. Telegraphed Dawson  
at 9 am to get water, gasoline &  
provisions on board. Took Hall  
train. Telegram not delivered until  
after my arrival about 1:20.

Got on gasoline, ice, provisions  
left at P.M.

This morning Dawson & Stanley  
had watered & charged batteries.

8/9/17.

Got away from Gravesend Bay at 4:50 am. Bused tide to steel gate. Water here remarkably quiet probably because almost dead low tide.

Ran well to New Haven. Got in about 5 PM. Timed speed of boat at Execution Rocks. Just under 8 knots per hour.

Went to Naval Base at New London to find about gasoline. Informed that could not get any there but could at second slip "this side" of bridge. Could not locate this slip but was directed to Standard Oil dock on other side of bridge.

Steering cable overlapped on drum and had some trouble getting to dock. Then more trouble getting gas. Took on 50 gal. & anchored outside for night.

8/10/17.

Engine hard to start. Got away at 8:20 am.

Sea a little rougher than previous day - cross red with white caps.

Made nets about 9:40. Patrol boat directed us through between "red and white buoys" as I understood though he probably said "red & white gas buoys".

Sun was directly in front so as there were white buoys to port we ran between red gas buoy & white buoy. Second guard ship called us down for not running between red & white gas buoys which were very plain from his side, with the sun but we did not see against the sun.

Made Pag Harbor about 1 P.M. Went to Station & telegraphed and got information about (Biscoe)

Found Mr. Pleasant at Bliss  
Co. who extended every courtesy.  
Tried to arrange that we had established  
base.

Met Mr. Miserand who first  
said probably would have no  
torpedoing battery to fire but  
on telephoning found 6 were  
coming and would be fired.  
Arranged to test tomorrow  
and listen in on their firing.

8/11/17.

Up at 6. Saw Miserau who  
said he would give us pilot  
out to testing grounds in time  
to get there & set up. Left  
Sag Harbor, about 9:00. Went  
to 1st secw on course,  
4000 yds from firing point  
and anchored 300 yds to right.

200 yds 4000 yds

These distances  
accurately  
determined  
by secw and  
by stakes.

Net.

Put out #2 Reemers on tripod  
in 30 ft water as the sea  
was quite rough with occasional  
white caps.

(15)

Test to hear Torpedo on  
Bliss Co. proving grounds.

Reemer #2 (Bell phone with horn)  
on tripod in 30 ft of water  
pointed at right angles to  
course of torpedo, 4600 yds  
from firing point, 800 yds  
off course.

Heard the 1st Torpedo plainly  
and from evidence, the whole  
length of course. It sounds  
more like a car running  
around a curve than any  
thing I know. There is not  
a single note but a lot of  
series of notes mixed together.  
If one is more prominent than  
the others, it seems to be  
A =  $435N$  for seconds. <sup>Reemers</sup> northward (all)

Note. Launches running  
after torpedo mask the  
sound.  
Must try and get tests  
where launches are a  
greater distance away.

Found part of noise from input  
wire on coil near a battery  
which may have been passing.  
Believe we should run this input  
the whole way in lead covered  
cable. We need special reel  
to hold this.  
Have one made in Lab

### (Torpedo stopped)

2nd Torpedo. Did not hear  
when they said it was fired  
but heard a series of  
crashes & bangs like explosions.  
Then heard it later but not  
plain & heard a launch with  
it. Heard it only a little  
time when it stopped short.

3rd Torpedo - Could hear only  
when passing. Then very loud  
estimate heard only about  
2000 yards on either side of  
horn.

Found batteries low - incapable  
of giving 1.8 amp. to 1st  
audion ball audions low.

2 launches at 200-500  
yards. Chased torpedo for  
awhile.

4th Torpedo. New Batteries on.  
Audions. Somewhat noisy -  
some crashes.  
1 min 45 sec after firing - first heard.  
3 min. Very loud. High pitched  
distinctive note.

3 min	40 sec	- permed loudest
4 "	30 "	loud, diminished
5 "	00 "	loud, plain
5 "	30 "	hear
6 "	00 "	still hear.
6 "	40 "	& different noise
		hear launches plainer
		than torpedo
7 min	30 sec	hear launches only
8 "		" " "
9 "		" " "
10 "		" " "

Then changed output around to  
 pair of head receivers on deck  
~~so that~~ could see and hear  
 too.

Lannock went by. Could  
 hear plainly for 1500 yds at  
 right angles to beam.



$$\begin{array}{r}
 255 \\
 \times 1000 \\
 \hline
 102500 \\
 18000 \\
 11000 \\
 \hline
 255000
 \end{array}$$

$$\begin{array}{r}
 8000 \\
 \times 3600 \\
 \hline
 288000
 \end{array}$$

14000

$$\begin{array}{r}
 255 \\
 \times 1000 \\
 \hline
 102500 \\
 18000 \\
 11000 \\
 \hline
 255000
 \end{array}$$

$$\begin{array}{r}
 190 \\
 \times 1330 \\
 \hline
 25270
 \end{array}$$

5th Torpedo. <sup>running</sup> No launch, up & 4000  
yards then slowed.  
Listened to on deck.

First heard after launching. 1 min 50 sec  
Loud at 30"  
Roundest 4 min.

Made 4000 yds in 4" 15 sec  
Launch started. 4" 40 sec  
Torpedo loud 6" 00"  
Hear pump 6" 30"

but believe launch is quietest part  
Hit net 7" 27 sec  
Believe I could have heard fuel  
pump except for launch.

This sound at 7:27 must have been 1000 yds.  
Launch came back. At 2000 yds  
very loud. X

Dawson took note of sound said  
two notes. Show  $P \times C = 384$ .  
✓ 51% variations per second.

Straight No boxes in -

Landing  
7:10  
10:10  
18:57

Note These torpedoes are fired for test with 60% air. Under service conditions are fired with 70% air. Hence the difference in velocity to 1000 yds and to 12,500 yds.

4000 yds	4:05	4000 yds	4:04
7000 "	6:58	7000 "	7:02
10000 "	10:07	10000 "	10:00
12500	13:42	12500	12:58

Missed 5:25 P.M. train yesterday  
and left sp. 5:15 this morning  
arriving about 9:20.

Naval Lieutenant (did not get name, J. grade, Advance Dept.) warned me to be careful of two Japanese on the Hume Boat. They were anchored at dock. They were suspected of being Japanese Naval Officers.

Started for testing grounds  
soon as possible. Arrived  
11:50 at tug.

Went aboard. Found they would  
fire until 4:30 PM.

Order  
500 yds #18 & #19 Red & Black  
Rubber covered wire. Jerry can  
dummk sample. Express care  
E. M. Bliss Company.

- Write Mr. E
- ① Launching pressure here & better  
conditions
  - ② Red in wires shorted.
  - ③ Range Difference.
  - ④ Trouble with audion circuit in  
addition to lead in wires.

Get Tape

⑩  
Launched #2 Rescuers. On test  
proved defective. Could not  
hear a torpedo which had  
been fired, a launch or a bell.

Took in and tested out & found  
short circuited and that this  
short circuit was in the  
lead in wire.

This caused us to miss torpedoes  
#3, 8, 9, 10, 11, 12, which were  
fired.

Took off #2 transmitter. Some  
moisture around tape on top but  
Charleston compound seems intact  
and seems to have protected joint.  
Connected up new transmitter (for wire).  
Audion circuit very noisy even  
when short circuited.

Do late we will have to go in and  
telegraph. Not fast tomorrow and  
get ready for torpedoes.

8/14/17.

Left 5:45 for testing ground to get ready.

Put out .002 wire transmitter on tripod. Tested with hel. Could hear right away but could not hear at 500 yds. Circuit very noisy.

Looked ~~phonion~~ circuit over. ~~Found~~ found two loose connections, one on A battery, the other at B. battery switch.

Then tested out. Circuit quiet on disconnecting transmitter & substituting Reed Receiver. Circuit quiet on testing with new .002 wire receiver out on tripod.

Tested with #2 (E<sup>1</sup> Bee), Could hear to 60 at 100 yds. Could not hear at 700 yds at all.

$$\begin{array}{r} 14.2 \\ 0.15 \overline{) 14.700} \quad (280 \\ \underline{30} \\ 1700 \end{array}$$

$$\begin{array}{r} 0.48 \overline{) 13.700} \quad (285 \\ \underline{96} \\ 4100 \\ \underline{3120} \\ 980 \end{array}$$

Then disconnected underwater receiver & connected Bee receiver. Audion circuit seems sensitive. Clock 8 ft away very loud on low.

Measured resistance under water receiver. Bridge returned to Lab so had to use ammeter-voltmeter method.

$$\text{Current } 13.7 \text{ volts} - .08 \text{ amp} \\ = .181 \text{ ohms.}$$

$$\begin{array}{l} \text{Measured \#1 receiver out of} \\ \text{water} \\ = 4.2 \text{ volts} - .050 \text{ amp} \\ = 84 \text{ ohms.} \end{array}$$

Then again measured resistance of new receiver, which had been withdrawn from water and wire allowed to dry.

$$\begin{array}{l} .015 \text{ amp } 4.2 \text{ volts} = 280 \text{ ohms} \\ .048 \text{ amp } 13.7 \text{ " } = 285 \text{ " } \end{array}$$

$$\begin{array}{r} .856 \text{ ) } 3.7 \\ \underline{116} \\ 210 \\ \underline{174} \\ 360 \end{array} \quad (236 \quad 65$$

$$\begin{array}{r} 06 \quad 65 \text{ ) } 13.7 \\ \underline{130} \\ 700 \\ 650 \end{array} \quad (211$$

$$\begin{array}{r} .178 \text{ ) } 14.80 \\ \underline{136} \\ 90 \end{array} \quad (85.00$$

258.1

0024.1300

258.0

872.700

211

872.700

Again hit new reservoir & wire into water.

Reeking ① .058 amp 13.7 volts = 286 ohms  
 " ② .065 " 13.7 volts = 211 ohms  
 " ③ .070 " 13.7 " = 196 "  
 " ④ .090 " 13.7 " = 154 "  
 " ⑤ .100 " 13.8 " = 137 "

Then left during lunch.

" ⑥ .000 13.7 " =  $\infty$  "  
 This means that the circuit is open somewhere and has been leaking.

Cut wire loose from receiver.

Wire showed continuous continuity but test under water showed break down of red lead - that is that the red lead was grounded.

Test of resistor alone showed 150 ohms resistance.

Probed as to where the break was.

Then tested out lead covered wire as this is the only continuous good wire we now have.

This tested O.K. in continuity and no grounds.

Connected lead covered wire to receiver. Circuit showed OPEN.

Disconnected lead covered wire from receiver. Wire circuit O.K. Receiver circuit OPEN.

It is evident that an intermittent open circuit in this receiver has been deceiving us all day.

Then used #2 Receiver in place of new receiver. Wired temporary to lead covered wire. Tests out O.K. Wired permanently with water proof joints. Tests O.K.

No torpedo tests made today by Bliss Co.

8/15/17.

New course in Noyack Bay.  
In this course the torpedo is fired at  
right angles to course, has to turn  
and make course.

(17)

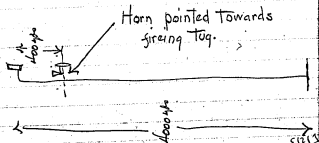
Set out #2 receiver on tripod at  
400 yards.

Had no time to test as they  
were ready to fire.

Heard torpedo immediately it  
struck water unmistakably.

Men off horn could not stand  
tutors to ears. Deafening.

Could hear about 15 minutes.  
Lamphes interfered.





these are special torpedoes which leave very little wake.

We could not see them more than 300 or 400 yds away.

Waste of ordinary torpedoes due to smoke of superheat of air.

NEED - BETTER LEAD IN CABLE.  
and reel to handle.

Also better tripod and means of launching.

Went in to tug to see Mireraw. He promised to keep launches from running while torpedo was running.

Staked off accurately 1000, 2000, 3000 yds. Range buoys for us.

Found from him that the two propellers on the torpedoes run at two different speeds. Hence the screech of not one but two musical notes before recorded.

(18)  
Range 400 yards.  
Heard torpedo instant struck water.  
Could hear 1 min 25 sec above other noises - which were coming from tug.

these are special torpedoes which  
leave very little wake.

We could not see them more than  
300 or 400 yds away.

Waste of ordinary torpedoes due  
to smoke of superheat of  
air.

NEED - BETTER LEAD IN CABLE.  
and reel to handle.

Also better tripod and means  
of launching.

Went in to tug to see Miseraw  
He promised to keep lamplighters  
from running while torpedo  
was running.

Started off accurately 1000, 2000,  
3000 yds. Range lights for us.

Found from him that the two  
propellers on the torpedoes run  
at two different speeds. Hence  
the screech of not one but  
two musical notes before  
recorded.

(18)  
Range 400 yards.  
Heard torpedo instant struck  
water.  
Could hear 1 min 25 sec above  
other noises - which were  
coming from tug.

They fired a small torpedo  
before we were ready.  
Absolutely invisible.

Moved to (19) 1000 yards (accurate)

Heard 1 second

Soundest 1 min 10 sec.

Heard N = 30 sec

Made 4000 yds in 4 min 45 sec

No landmarks running.

Only noise of waves  
some white caps.

(20)  
Range 1000 yards. (accurate)

Wind Rising. Sea getting Rough. Numerous

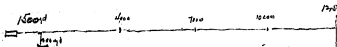
White Caps.

Signalled all boats in. Before  
we got tripod set again, fired  
last shot for day

Start next Report

8/16/17.

On Gardiners Bay Range. (Long Range)  
Anchored at estimated 1500 yds  
from firing tug, 200 yds off  
course.



Used #2 Reimer on Tripod. Horn  
pointed at firing tug. Lead covered  
input wire.

This is too short and does  
not lie on bottom.

(21)

Second shot of day. Not quite  
ready. I heard ~~at when shot~~ and thought  
I heard about 500 yds first 4000 yds  
seen.

(22)

Same conditions as 21 but I did  
not know when shot was fired  
and yelled to Dawson when I  
heard who took time interval

Missed 3d shot. Cable got  
tight due to not enough lead  
lowered cable & led to reach  
horn.

Missed 5th Shot  
Missing

Time to hear.  $2\frac{1}{5}$  seconds  
Lowest. 1 min 55 sec  
Passed 4000 yds. 4"  $25\frac{1}{5}$  sec  
Can not hear. 5" 35 "  
Passed 7000 yds. 7" 57 "  
Passed 10,000 yds.  
Passed 12,500 yds.

(23)

Same as 22. as torpedos started.  
Launch about 3000 yds away but stopped.  
Time to hear  $7\frac{1}{4}$  sec  
Lowest 1 min 58 sec  
4000 yds 4 min 10  $\frac{3}{4}$  sec  
Can hear to 5 min 45 sec  
7000 yds  
10,000 yds 10-32  
12,500 yds

(24)

Same as 23 but 2000 yds.  
about 400 yds off course  
Time to hear  $5\frac{1}{5}$  seconds  
Lowest 2 min 21 sec  
4000 yds 4" 4 "  
Stop hearing 6" 35 "  
7000 7" 05  $\frac{1}{5}$  -

10,000 -

10 mm 10  $\frac{1}{5}$  sec

12,500 -

(no lamphes running)

(25)

Same as 24. Except that  
bug started up & made noise so  
could not hear torpedo as far

Hear

9  $\frac{1}{5}$  sec

Found

3 mm 40  $\frac{1}{5}$  sec

4000 yds

4 "

8 sec

Can't hear

5 "

7 "

(mine of trap)

7000 yds

7 "

5  $\frac{3}{5}$  "

10000 "

10 "

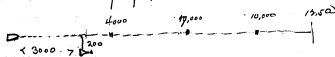
10  $\frac{1}{5}$  "

(26)

~~Same as 25~~

~~Hear~~

8/17/17.



Set up as above same as yesterday using #2 Brown with lead covered input. Ranched on trips from boom.

Day threatening - rain, thunder & heavy clouds. Wind in gusts rather than swift & steady.

(26)  
Distance 3000 yards

Time to hear	15 sec
Lowest	3 min 0 sec.
4000 yds	4 " 18 "
7000 "	7 " 22 "
10000 "	10 " 37 "

Plash as run to surface or in plash at about 3000 yards.

Big & launch running. Could not tell when ceased to hear.

Wide angle. Horn to pick up  
from various directions.

(27)

Same as 26  
High wind & white caps here

Hear 17 sec.  
Lowest 2 min. 52 sec.  
4000 yds 3 " 45 sec  
Launch started 5 " 55 sec  
interrupting when  
sound lost

7000 yds 6 min 25 sec.  
Could not see 10,000 or 12,500

(28)

Same as (27)  
Wind quieted down. A boat, slow  
speed engine running.

Hear 25 sec  
Lowest 3 min 38 "  
4000 yds 3 " 47 "  
Launch started 5 " 25  
Can't distinguish from launch 6-25  
7000 7-42  
10,000 10-53  
12,500 13-55



(29)

Same as 28. Tides launches  
running at first & current  
misty prevented early hearing

Hear	37 sec
Foudest	3 min - 15 sec
4000 yds	3 " - 55 "
Can't hear	6 " 29 sec
7000 yds	6 " 50 "
10,000 "	10 " 00 "

Torpedo off course - 200 yds at 4000

(30)

Same as 29 but 4000 yds.

Distance	4000 yds
Hear at	1 min 26 sec
Foudest	3 " 50 "
4000	4 " 55 "
Lost hear	5 " 29 "
7000	6 " 05 "
10000	10 " 05 "

Note

Against sun impossible to  
see wake of torpedo.

(31)

Same as 30  
Sea rather quiet. Breeze wind.  
Distance 4000 yards.  
Heard 1 min 8 sec  
Furthest 4 min  
4000 yds 4 " 18 "  
Launch started at 400 yds marked here  
7000 " 7 " 67 "  
10,000 " 10 " 67 "  
12,500 " 13 " 3 "



8/18/7.  
Weather Rough, High Wind,  
Rollers and White Caps.

140 yds

Set up beside the torpedo firing boat  
in attempt to get distance can  
hear torpedo.

Used Rescuer #2 Launches on  
tripod, lead covered input cable.

(82)

Wind getting worse.

2 launches running at 2000-2200  
yds. So much noise that it is  
impossible to distinguish torpedoes  
except when "loud" - that is  
approximately 1500-2000 yds.  
Could not hear - indefinite.  
7000 yds in 6 min 22 sec

290 = 23.9  
435 = 13.7

(33)

Same as 32. Wired getting stronger.

No launches running.

Could not hear about 5 min 45 sec

4000 yds 4" 05"

7000 " 6" 45"

10,000 " 9" 55"

Believe safe to say can hear 3000 yds.

(34)

Then connected up the resonance  
tube to audion circuit. High Wind

Launch in 20 could not

separate

Response at 13.5"

Could not determine whether  
Launch or Torpedo made this noise

(35)

Same as 34-

Hardly heard to 5 min 30 sec (5000 yds)

with tube. Firing tug then left  
grounds and interfered. (Embalame)

Heard best at 6.2"

512  
23  
640

8/20/17

Repeat Saturday's experiment as  
conclusions then were indignant.

1000

4000

7000

10,000

12,500

Wired moderate small white caps  
#9 Resonator mounted on tripod used.  
Resonance column and head telephone  
in parallel on output circuit.  
Resonators are high resistance column  
lower so that they shunt the resonator.  
(24)

Resonators hear

3 min.

Tube Post

3 min

7000 gap

7-23%

Tube has balanced diaphragm  
and tuned to 6.1" air column.

Dawson listened in to get torpedoes  
note. Says there are several  
of which the lowest and most  
prominent is E' - or 640 vibrations  
per second.

(45)

16 | 6.1.0  
4.0

Handley was able to tune out launch running just previous to torpedos. Dawson confirmed this. Handley reports that in his telephone room a variety of noises could be heard. The tube diminishes these noises and leaves the torpedo note at 6.1" tuning undiminished.

(37)  
Same as 36 to confirm but will use new points on tube.

Torpedo fired without hail being raised as we were not ready. Sounds very weak in earpiece.

Ear piece's Post	4 sec
Lunch started	min 5 sec.
Column gone	4 min 20 sec

Could not hear at 6.1" tuning  
Heard at 12.1" tuning  
Most prominent note Eb about 600 vibrations.

Handley says not as loud as before  
Audison down so that filament C = 1.1 m.p.s.

1.5  
1.2  
3.8

38

Same as 37  
Mind now up. numerous white  
caps on bay.  
Brought anderson back to 1.3 film  
current.

Car Reverses lost at 1 min 30 sec.  
Tube lost 40 sec.  
4000 up 4 min 10 sec.

Resonance tubes hear at 12:1 turning  
Lawson says note was different  
from before & could not easily  
distinguish. Sounded G = 384.  
Heard very faint in telephone ear pieces.

Mind too high here so Embellane  
(Tapedo firing tug) stopped firing  
and put back for Bay Harbor.

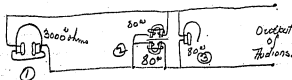
On pulling in horn, found one  
of the ropes fouled so that  
the tripod was upset. Think  
this occurred from roll of boat  
between the 36 & 37 experiment.

8/21/17

Hanley left last night so  
Dawson and I had to take the  
resonance tube and learn to  
use it.

The water supply at first would  
not drive the water high  
enough. This proved due to  
air in the siphon tube.

(39)



Preliminary for Dawson to get  
get used to Resonance tube.

Used #1 Resonance on tripod.

Lead covered input.

Resonance tube which balanced  
diaphragm.

Could hear typewords with ① telephone  
ear pieces for 3 min 11 sec.



Torpedo made 4000 yards in. Linn 38 sec.  
Dawson turned to 1/2 pitches at 10" x 7".

Same as (39)  
38  
With telephone saw burst to min 27 sec.  
Dawson saw heard at 6.1" - 4 min  
at 9.9" - 7 min.

Note was E = 320.  
This was a "ceel" torpedo -  
superheater did not work.  
Made only 4000 - 5000 yards.  
Could see it creeping along.

Same as (40)  
39 but removed D.  
telephone saw pieces.

Dawson reports at 6.1" heard 3 min  
8.2 " 5"  
10.1 " 7"

At 6 min a launch started up.

Went over to Embury and was informed that the torpedoes propellers make 1300 R.P.M. and have 4 blades

$\frac{24 \times 1300}{60} = 52$  vibrations per second. The noise of a torpedo certainly does not sound this low a note.

Launches up to #11 make 400 R.P.M. #11 makes 600 R.P.M.

(41)  
Same as 39.

Audions have a high pitched "whistle" heard with telephone ear pieces to 1 min 20 sec

Torpedo made 4000 yds 4 min 21 1/2 sec  
" " 7000 " 7 " 25 1/2 "  
" " 10000 " 10 " 37 "

Dawson started resonance tube at 50 and worked up. Heard at 50 & 34 loudest. Stopped at 28 and thought he heard torpedo but sound did not diminish. Probably pump on

Emblane

(42)

Exchanged places with Dawson.  
I took residence column.

Water moved not far above  
86".

Water moves up and down  
in column so slowly it is  
practically useless. Torpedo has  
gone before you can turn for it.  
Water takes 4 min to go from 6 to 56.

(43)

Dawson at Resonance Tube.  
Heard torpedo with head telephones

to	1 min 37 sec.
Torpedo made 4000 yds	4 " 13 1/2 "
Launch starts	5 " 0 "
Torpedo made 7000 yds	7 " 14 "
" 10000 "	10 " 19 1/2 "

Dawson heard to 17 for 4 min.  
Then tuned to 32 - heard too long  
Sound did not die away.  
Believes he can hear torpedo  
at any place on column.

(114) same as 1's  
Dawson at Resonance Tube.  
High telephone ear piece hear torpedo 1 mm. 5000  
Torpedo made 4000 yds - 4 mm. 7 sec.  
" " " 7000 " 7 " 03"  
Dawson heard Torpedo but sound  
of pump on Emulsion became  
more prominent at 17 lining.

Is unable to tune so that torpedo  
sounds loud and other noises are  
cut out.

(115) Same as 1's except K at Resonance Tube  
Note of torpedo very close to 300  
oscillations per second.  
Then close could hear this note  
prominently.  
Tube seemed to tune to this at  
12.1".  
Other popping & crackling  
noises coming in excited  
resonance tube to give same  
note.

8/21/17

Storm last night. High  
wind this morning - too high  
for Embeline to go out.

I went to Orange to see about

- ① Cable which came wrong.
- ② New Receiver Leads
- ③ Mr. E's coming to Sag. Harbor.
- ④ Cash.

No readings to day

8/22/17.

Mr. E. arrived on Dasher  
about 8:30.  
Embarkation did not go out  
but we went to Noyack Bay  
to test audions against Moore's  
new microphone.

~~Discussion with Moore  
about the new microphone  
and the results of the  
test. Moore's microphone  
is better than the old one.~~

~~On the 22nd of August  
30 feet of wire was used  
and the results were  
the same as the old one.  
The new microphone is  
better than the old one.~~

On Short Range (Noyack Bay)  
Connected up Moore's new  
microphone transmitter. With  
batteries alone (without audions)  
bell could not be heard.

They connected up audions  
so that could use Moore's microphone  
and #2 Receiver alternately.

Moore's microphone whistled and  
chirruped very badly. Also  
absolutely insensitive so that  
a bee flying on stem could  
not be heard.

Could hear Jaynotes 1000 to 2000  
yds away with regular #2  
Receiver.

Moore then took microphone  
out of water. Water ran out  
of equalizing tube proving that  
this had leaked and admitted  
air. Badly injured diaphragm  
less sensitive.

On putting back in water,  
whistling stopped. Microphone  
very sensitive but poor on  
no quality. Sautch & torpedos  
sound nearly same.

(46)

Moore's Microphone suspended  
from side of boat as input.  
Short Range - Noyack Bay.

1000 yds

1000 yds

4000 yds

Could hear torpedo, from time fired  
until reached 4000 yds.  
The sound is not clear - there is  
a humming and excess of swane  
whistles mixed with the torpedo.

Torpedo also has only low note.  
Does not have high notes  
hear with #2 Receiver.

Moore's Microphone is very  
sensitive but has very poor  
quality - says badly and has  
lot of noise.

Is 30 times as sensitive as #2  
Receiver but poor quality



①

1- 49 1/5 sec  
 4000 - 4 13 1/5 sec  
 7000 - 7 - 14 1/5  
 10000 - 10 - 21  
 12500 - 13 - 15



③

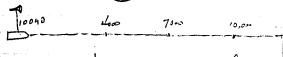
2- 50 sec  
 4000 - 4 - 20  
 7000 - 7 - 15  
 10,000 - 10 - 17  
 2- 38 3/5  
 4000 - 4 - 11 3/5  
 7,000 - 7 - 9 1/5  
 10,000  
 12,500

8/24/17.

On Long Range in Gardner's Bay.  
 Launched #3 Reconn with lead  
 covered input.

Jerry listened in to confirm  
 previous records by Dawson  
 & self.

④



Jerry says torpedo sounds like  
 street car around corner - screech  
 as described.

Pump on Emlane 100 yds makes  
 considerable noise.

Jerry listened in.  
 Audition of "how"

Jerry ceases to hear  
 torpedo makes 4000 yds

1 min 49 1/5 sec.

4 " 13 1/5 "

7 " 14 1/5 "

10 " 21 "

13 " 15 " (11.5)

" " 7000 "

" " 10000 "

" " 12500 "

(47)

Deussen took  
Jerry sent him  
Deussen "  
4000 "

2-00.  
4-25  
4-09  $\frac{1}{2}$

$\frac{2.59}{3.42}$

(48)

Same as 47 except Audions  
on "High".

Jerry ceased to hear torpedo	2 min 50 sec
Torpedo made 4000 yds	4. 30 "
" " 7000 "	7. 15 "
" " 10000 "	10. 17 "

(49)

Same as 48 but tender was  
run around Rampant to make noise  
Jerry ceased to hear torpedo 2 min 28  $\frac{1}{2}$  sec.  
Torpedo made 4000 yds 4. 11  $\frac{1}{2}$  "  
" " 7000 " 7. 9  $\frac{1}{2}$  "

More connected microphone to  
Audions. Made intermittent  
musical note like wireless.  
This was so loud as to obliterate  
other sounds characteristic  
of the source

(50)

More then connected up his  
microphone with pair of Bell  
Telephones to work as load on

Connected Bell telephones in series and found not nearly as good.

receivers.

Used this at same time as Audions. Dawson listened to Audions, Jerry to Moore's microphone.

Jerry test torpedo with microphone in 2 min.  
Dawson " " Audions 4 min. - 75 sec.  
Torpedo made 1000 yards 4.09  $\frac{1}{1000}$

*2nd Memo*  
Airplane left here.  
Dawson listened in on her leaving and could hear for 8 minutes, estimated at 2000 yards.

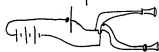
Dawson listened in on 2 torpedoes with Moore's Microphone. Said note was musical, clear and distinct and  $G = 384$  vibrations

Best connection for Moore's microphone 3 models in series, 2 Bell Receivers to both ears connected in parallel.

Think it would be a fine idea to use Moore's microphone with one or two audions.

A-5

Test of Mones Microphone  
 Tended right out and Jerry lost  
 in 250 yards.



#2 Microphone

Sea choppy. Saw white caps. about 1/2 mi.

mind Shy W.

B-6 only ~~some~~ <sup>Kennel</sup> <sup>Laurel</sup>

Moses connected our horn on his  
 microphone connected as above.

~~Bees~~ Rang Bee. Characteristic sound  
 with cunctos. #1 microphone

Made about 1000 yds when  
 Jerry could not hear short funnel

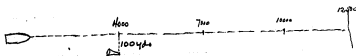
C-7.

Same as B-6 except Moses  
 used #1 microphone

As adjusted, this microphone  
 varies periodically, getting louder,  
 then softer.

Jerry ceased to hear at about  
 800 yards.

8/25/17.



Weather - Ideal at 8:30 am. Absolute  
Calm. not a ripple

Missed first shot because not set  
up. If sea apparatus is designed  
with rings to hang and rods  
so as to hang in fixed direction,  
much time should be saved.

Could hear noise of SP192's pumps  
through air 2000 yds off. Could  
also hear with mbones microphone  
and could hear through megaphone.

Have never had such quiet & ideal  
conditions before.

Microphone gives trouble by intermittent  
huzzing. This seems due to  
intermittent contact at microphone  
points.

1st shot missed  
 2nd shot microphone in bad condition  
 Jaws 1-56  
 Jaws 3-36  
 Slow 3rd launch running 400 yds off (1st shot)  
 4000 = 4-04  
 Bliss launch started 4:10 - 100 yds away.  
 2nd Bliss launch running by at 100 yds.  
 Torpedo to right of course  
 7000 = 7-10  
 10,000

1st shot missed. Not Ready

2nd shot (57) 9:10 am  
 Weather perfectly calm.  
 Morse #2 microphone pointed at Emblem  
 Jaws 1st hear torpedo 1 min 56 1/2 sec.  
 " says loudest 3" - 36"  
 4" - 04"  
 7" - 10"  
 Microphone insensitive and having  
 intermittent buzzes  
 Slow speed launch running 400 yds off stern  
 Bliss launch started 4:10 - 100 yds away  
 2nd Bliss launch running 100 yds away  
 These launches prevented hearing torpedo  
 further.  
 Torpedo ran to right of course about  
 40 yds at 4000

3d shot missed. Microphone out  
 of order.  
 Jaws heard torpedo swimming  
 at about 300 yds. Says note  
 was C' = 512 n.

Jerry heard 35 sec.

Jerry can hear Bliss Lamnuk with  
microphone at 3000 yds.

4th shot

10:45am Still very  
calm

(52)

4th shot.

Same conditions as D.  
Microphone in good order.

Jerry heard torpedo in 35 sec.

Roudest

3 min 55 sec

I heard to (3000 yds) 7. 17 sec

Jerry listened to our lamnuk and  
could hear about 500 yds.

5th shot missed record. Lamnuk  
paying attention to ball. Jerry  
thought

5th shot missed record. Has not  
paying attention to ball.

~~shot~~

(53)

same as E

11:37 Am

Weather overcast. Fog to West.

Dead Calm

Jerry heard Torpedo

38  $\frac{1}{2}$  sec.

" deep burst

3 min 55 sec

4000 yds

4" 65"

Jerry can't hear

5" 48  $\frac{1}{2}$ "

Ship Launch towing torpedo back  
about 2000 yds away marked.

Torpedo about 20 yds to starboard.

(54)

~~6th shot~~

Slow speed launch 1000 yds away  
towing boat.

12:04 P.M.

Dead Calm

Jerry hears

1 min 46 sec

" " loudish

6" 50 sec

→ 4000 yds

7" 47  $\frac{1}{2}$ "

Jerry can hear

10" 57 sec.

Cold shot going slow



(55)

12:49 P.M.

Dead Calm.

Tray to westward

Jerry hears torpedo  
Launch started from Ambulance  
4000 yds away just before  
torpedo.

55 sec

Jerry says loudest

4 min 15 sec.

4000 yds

4 " 27 "

Dawson says note is E' = 640 N

Jerry can't hear

6 min 56  $\frac{2}{3}$  sec.

(56)

1:19 P.M.

Dead Calm

Clearing.

Jerry hears torpedo

1 min 53 sec.

Jerry says loudest

4 " 0 "

4000 yds

4 " 8  $\frac{3}{4}$  "

Blanchard starts 100 yds away

4 " 10 "

Jerry can hear it

6 " 16 "

(57)  
2:00 P.M.

Dead Calm

Jerry hears torpedo #r 1 min 25 sec.

" " " loudest 4" 0 "

" " " loudest 7" 05 "

More listening in on his  
microphone #1 without horn

More hears torpedo 1 min 30 sec

" " " loudest 4" 00 "

" " " loudest 6" 56 1/2 "

Kennedy heard with ears under  
water, sound like wind through  
telegraph wires. Heard 3 min  
after started or for 1000 yards

(58)  
2:58 P.M.

Dead Calm

Kennedy hears torpedo (#r) 1:53

" " " " 6:45

More hears torpedo (#1) 1-16 1/5

" " " " loudest 4-20

" " " " 7-00

In 6:45 Bliss launch started

100 yards away. K. could  
not distinguish torpedos after  
this time.

# Rampant <sup>26t</sup>

Frank Kingland Capt 100.00  
 Peter Oelan Silver 55.00  
 James Carmody Steward 75  
 Newman

PA for May.  
 May 26 ✓  
 June 8 ✓  
 June 8 ✓  
 Aug 23

6/1/17

Carmody

Less milk

advance 10.00  
 .25

Yankee

John	3.95 ✓
Cook	✓ 1.50
Cook (Lawson)	✓ 5.00
John	1.00 ✓
John	2.00 ✓
Cook	20.00
John	2.00
John	1.00
Cook	20.10

---

John	\$ 43.61
Cook	11.65

---

60

$\frac{240}{200}$   
 $\frac{70}{5}$   
 $\frac{5}{25}$

15

3 - 4

15

8.56

53.56

9.95

43.61

60

$\frac{215}{15}$  (214 4)  
2 856  
30.

5.95  
1.00  
20.0  
24.0  
12.0

9.95

5/1 - 1/30/4  
5/2 - 1

8.33  
25.00



135



P. 1

**Notebook Series -- Notebooks by Experimenters Other Than Edison  
Navy and Wartime Research Experiments -- A. M. Kennedy Books  
Notebook, N-17-08-27**

This notebook was used by Absalom M. Kennedy during August-October 1917 for notes on experimental work for the U.S. Navy performed under the direction of Edison during World War I. The entries relate to a series of experiments, numbered from 59 through 108, on submarine torpedo detection. The experiments at the beginning of the book, which contain extensive notations by Edison, involve the use of various combinations of transmitters and receivers to listen to torpedoes fired from the USS *Emblane* at Sag Harbor, Long Island. Information is provided regarding weather conditions, other vessels in the vicinity, and the time elapsing before the torpedo was first heard, as well as when its sound was the loudest and when it could no longer be heard. There are also experiments with microphones, receivers, torpedo floats, towing ropes, and containers conducted at Gardiners Bay, Greenport Harbor, and other Long Island locations. The notes indicate that Jerry T. Chesler, E. Rowland Dawson, and Sherwood T. (Sam) Moore assisted with the work. Inserted into the book are sixteen small pages pertaining to experiments 74-80. The front cover is labeled "Experiments #5. From 8/27/17 to 10/9/17." The pages are unnumbered. Some pages have been removed from the book, and several pages of drawings have been pasted into it. Approximately 125 pages have been used.

8/27/17.

Schedule outlined by Mr.  
Edison for to-day.

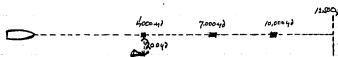
- ① Put Magneto on Big Horn - 002 wire
- ② Menie's Microphone on Big Horn
- ③ " " " Route "
- ④ Run your own engine, detach  
out.
- ⑤ If the running of your own  
engine don't shorten  
hearing distance as much  
as you expect, run your  
own launch in circle  
closely around your own  
boat. Listen in booth -



1. Time  
 2. Weather  
 3. Ground is soft  
 4. Ground is hard  
 5. Ground is wet  
 6. Ground is dry  
 7. Ground is  
 8. Ground is  
 9. Ground is  
 10. Ground is

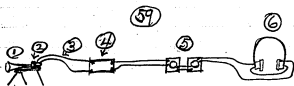
11. 1st  
 12. 2nd  
 13. 3rd  
 14. 4th  
 15. 5th  
 16. 6th  
 17. 7th  
 18. 8th  
 19. 9th  
 20. 10th

Lubbock 8/27/17.



Position - 4000 yds from Enclave  
 200 yds to right of course.

Weather - Bright clear morning.  
 Wind fresh N SW, some  
 white caps. Waves 8" to  
 12".



- ① = small horn on tripod
- ② = new, 002 wire, 1000 ohm receivers.
- ③ = Rubber covered, stranded  
pair wire with steel insert.
- ④ = Audions set on "high"
- ⑤ = Shunt holes set at 24
- ⑥ = 3000 ohm pair head receivers.

$$\begin{array}{r} 123 \\ 396 \\ \hline 5149 \end{array}$$

1233

$$\begin{array}{r} 123 \\ 396 \\ \hline 5149 \end{array}$$

$$\begin{array}{r} 123 \\ 396 \\ \hline 5149 \end{array}$$

3916

$$\begin{array}{r} 44 \\ 3705 \\ \hline 1233 \end{array}$$

Lubbock

(59)

Time

9:03 am.

Wind - moderates very few white caps.

Interference Also launch starts 100

yds away at 11 minutes.

123 mph Time to hear torpedo (3000 yds) 1 min - 14 sec

3916 Loudest 3" - 55"

Can't hear (3500 yds) 7" - 40 1/2"

Shot # 1

Notes:

2683 yds

Jerry in hatch so could not see start of torpedo at all and he yelled when could hear, loudest, and could not hear.

Can see torpedo coming against sun only about 300 yds. Can see it running away against sun for about 6000 yds.

$$\begin{array}{r} 255 \\ 3 \overline{) 765} \\ \underline{600} \\ 165 \end{array}$$

$$\begin{array}{r} 120 \\ 1600 \end{array}$$

In booth

(60)

Same as 59 except shunt  
holes ⑤ set at 40.

Time

9:20 am

Wind - same as previous

Interference - Bliss Ramah started  
up in 4 min, 100 yds  
away

Time to hear Torpedo (6000 yds) 2 min 00 sec

Loudest

4" 15"

Can't hear (6000 yds)

6" 25"

Shot # 2

4000 yds

4" 16 1/2"

7000 "

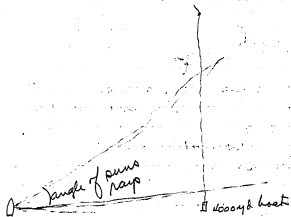
7" 24"

Notes:

2000 yds

Confirmed previous notes on  
being torpedo coming &  
going.

Evident can not hear  
as far with this set  
of boxes which is less  
sensitive



This torpedo had unusual amount of mist & smoke.

Could see coming for 2000 yds before it got in angle of sun's ray.

Then could not see until 800 yds. away.

Sun higher now making conditions different from previous experiment

In both

(61)

Same as 59 except shut horses with infinite resistance so as to make maximum sensitiveness.

Shot No 3.

Time

9-41 am.

Wind - liss, no white caps, waves about 6" high.

Interference - Bliss launch running about 1500 yds away, stopped when torpedo started.

Time to hear Torpedo

0 min - 7 sec (?)

Lowest

4" 08"

Can't hear

6" 43"

4000 yds

4" 15"

7000 "

7" 19"

Notes:

Jerry states at this sensitiveness, could not tell positively when started & when stopped, sure of torpedo sound above other noises only when loud.

See opposite page for sun condition.

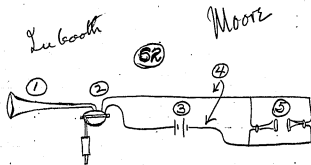
Sun now pretty well  
up in sky.

This torpedo showed  
up very great amount  
of mist.

Could see torpedo coming,  
2500 to 3000 yds off. Could  
see going 6000 yds.

2 Bliss launchers stopped  
when torpedo started but  
started after 4 minutes  
and at 7 minutes was  
100 yds off and masked  
time to "cant hear".

Rampant breeze to  
waves and rolling  
considerably.



Position same as 59

Apparatus -

- ① = Big horn
- ② = Moors Microphone #1
- ③ = 2 cells B-2 E.S.B.
- ④ = #18 Tinned Pair solid wire.
- ⑤ = Two Bell receivers in parallel ones on both ears.

Shot No. 4

Time 10:25 am

Wind Quiet. no white caps, only  
4" to 6" waves.

Interference Returns Runch 100 yds away  
at 7 min

Time to hear Torpedo (3500 yds) 0 min. 22 3/4 sec

Loudest 4 " 10 "

Cant Hear, (2500 yds) 7 " 39 "

4000 - 4:27 | 7000 - 7:47

Notes - see opp. page.

Lubatti

Moore

Same as

(63)

62

Spot # 5

Time 10:45 am.

Wind - still more calm.

Interference - Bliss launch running  
1500 yds away until  
torpedo started. Started  
up again in about  
4 min and at 6 min  
was 100 yds off.

Time to hear torpedo = Jerry yelled 1/2 minute  
before torpedo started.  
4 min 00 sec.

Lowest  
Can't hear (2000 yd) 7 15 "

4000 - 4:18 7000 - 7:28

Notes: Jerry yelled could hear torpedo  
1/2 minute before started. This  
was probably Bliss launch  
500 yds away.

Torpedo had very little  
vapor. Could see 2500  
yds coming + 5000 to 6000  
going.

Could see torpedoes  
3000 yds coming  
and 6000 yds going.

In booth

(64)

Same as 62 except engine of  
Pumpant running without  
clutch in at about regular  
running speed.

Spot # 6

Time 11:35 am.

Wind Light - very small waves.

Interference Bliss launch towing  
torpedo running whole  
time torpedo was running.  
The Bliss launch started  
up 100 yds away within

Time to hear torpedo. 1 min 07 sec

Lowest 4" 25"

Can't hear 6" 03"

4000 - 4:11 $\frac{1}{2}$  7000 - 7:19 $\frac{1}{2}$

Notes -

Engine running does not  
seem to interfere much  
if any.

2 Bliss Launches running  
very evidently distinguished  
from these.

(15)

→ around, all was confusion and nothing could be distinguished.

Thinks microphone the better of the two as less foreign sounds and the sound more distinctive.

Will make test when men listening does not know when "Steel is up" or when to expect torpedos

Suggest test without horn which seems to collect extraneous sounds and give all the same characteristics, or "horn tone".

(65)

Same as previous except tender running around Rampart same time engine is running with clutch out.

Shot # 7

Time 11:57 am

Visual Quiet - no white caps - 4" waves.

Interference - Large white yacht running 1200 yds. off. B. launch started in 4 min 100 yds off. Saw launch running around boat.

Time to hear torpedos. Jerry yelled 3 min before started.  
Loudest 4 min 15 sec  
Earliest hear Interference too great could not distinguish

4000 = 4:17 - 7000 = 7:25

Notes: Jerry says if did not know when ball went up and when to listen for, could not detect torpedo less than 300 yds away.  
With the engine running, and 3 launches running,



This torpedo made practically no vapor and was very difficult to see. Jumped out of water once & ran to surface two other times.

Same as <sup>(66)</sup>62  
Jerry listened to confirm and get ready for next test.

Step # 8

Time - 12:45 P.M.

Wind - Quiet - no white caps.

Interference - 1 Bliss Launch  
running slow 100 yds off  
when torpedo started.  
2 Bliss Launches met  
running in opposite  
directions about 600 yds  
away about 5 min after  
torpedo started.

Time to hear torpedo - 1 min 27 sec.

Loudest 3: 57"

Can't Hear 7: 15"

4000 - 4:13 - 7000 - off or stopped

Notes: Hearing launch just  
after test Jerry says the  
launch sound in microphone  
is very similar to torpedo  
sound, confirming  
what we found in  
audions. → see opp page.

→ and run to the right.

Just previous to this while waiting, both Jerry and Moore announced several times they heard torpedoes when launches were running.

Endlane then  
aft. no more torpedoes  
for day.

(67)

Jerry stayed down in booth from last shot to this so as not to know when ball was up or have any other warning of torpedo.

Spot # 9

Time 2 = 20

Wind - Up tripe. No white caps

Interference - none for 2 1/2 minutes. Then launch (Bliss)

#10 started towards  
Endlane.

Time to bear torpedo (Jerry 1 min 27 sec + 53 1/2" Moore 1 min 10 sec + 45")

Loudest Jerry 7 min 10 sec.  
Earl Hear (Jerry 7 min 40 sec.  
Moore 11 " 45")

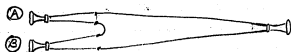
4000 7 min 18 sec 7000 - did not go

Notes: Moore put out his #2 microphone underneath him and listened also.

Crld shot - ran only half speed.  
Seemed to turn about 60° 40°

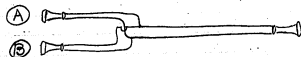
68

Test of 1 and 2 Bell telephones  
used as transmitters -



- ① Using in series as shown
- ② Short circuiting A so as to have only B working

Could not see any difference.



- ① Using in parallel as shown
- ② Disconnecting A

Could not see any difference

Dawson used vacuum shunt  
box set at 8.

### Notes:

Gerry listened on #1  
Moore " " #2  
Dawson " " #3

all went below deck and  
did not know when ball  
was up or torpedoes fired.

On account of rough sea  
I could not see torpedoes  
200 yds coming or 500 yds  
going.

as neither Jerry, Moore or  
Dawson knew when was  
coming they

Detected it absolutely!!!

Jerry and Dawson both state  
that because of the absence of  
noise and "horn tone" they  
can hear better without horn  
than with it.

Weather so rough Emblane stopped  
firing.

Was Dawson's shunt off - On 8

8/28/17

Booth not  
used

(69)

Comparative test between:

- ① Moore Microphone #1
  - ② " " #2
  - ③ 1000 ohm vacuum <sup>in voice</sup> & Audions 4 pipe
- What Ear phone used? 4 pipe

All were suspended overhead,  
without horns, pointed toward  
the Emblane.

Position - same as 57 - 4000 yds from Emblane

Shot # 1

Time 9:50 am.

Wind High - 15 miles White Caps. Naves 13°.

Interference - none until 4 min. 2-15%

1750 yds net 2250 yards definition 3 min  
Rise to bear torpedoes

3634 366

① before, started -  
② 2 min 05 sec  
③ 22 sec

Lowest

①	3 min	50 sec
②	4 "	0 "
③	4 "	0 "

Can't hear

①	5 "	36 "
②	6 "	30 "
③	8 "	40 "

4000-4:17 7000  
Opposite side

Torpedoes about 12000  
yards - not accepted

8/28/17

Notes.

(69) Shot #1

Chester heard it 1750 yds away 1600 yds afterward

Moore " 197 " 2500 "

Dawson " 3634 " 4666 "

notwithstanding White Cops was on boat & Bliss  
launched gaff 4 minutes after start of torpedoes  
This torpedo went 12000 yards did not  
make the 12500 yards & was not accepted

Dawson, 2.1 miles - 342 ft long 2.65 miles going

(70)

~~General Notes:~~  
~~Missed 3 torpedoes. 1 not~~  
~~set up. The first two passed~~  
~~and third stopped just beyond~~  
~~4000 yd seaw.~~  
~~1 and 2 announced all~~  
~~three of these and told when~~  
~~first & second passed.~~  
~~Long delay after third shot~~  
~~in which 1, 2 & 3 were~~  
~~set up. 1 & 2 made about~~  
~~4 or 5 false reports of torpedoes~~  
~~each. 3 made 1 false report.~~

### General Notes:

Missed 3 torpedoes, 1 not set up. The first two passed and third stopped just beyond 4000 yd seaw.

1 and 2 announced all three of these and told when first & second passed.

Long delay after third shot in which 1, 2 & 3 were set up. 1 & 2 made about 4 or 5 false reports of torpedoes each. 3 made 1 false report.

At 10:45 changed 1 from Meiss #2 microphone to #1 because #2 microphone gave false sounds.

At 11:21 changed back as more adjusted #2.

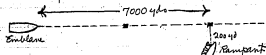
8/29/17.

(70)

### Comparative Test Between:

- ① Meiss Microphone #2 connected (Gerry on) to 1 stage audion <sup>type 1 in ch.</sup> 300 ohm cov.
- ② Meiss Microphone #1 without (Moss on) audion.
- ③ 1000 ohm receiver with 4 stage (Dawson on) audion, 80 ohm ear piece & on output circuit. Shunt box set at 8. Two mags open

All three were suspended overhead pointed toward the Emblane.



Position - 7000 yards from Emblane  
 200 yds off course as above

Shot # 4

Time 11:37 am.

Wind Moderate

General Notes continued:

Jerry, Moore & Dawson before <sup>torpedo</sup> was  
had no warning when fired.

I saw this torpedo with glasses  
coming 5000 yds away. Lost  
it when it went through a  
patch of sunlight shining through  
the clouds.

Watch with lubish time was  
taken about 13 minutes  
lost so that for absolute  
time 13 minutes should  
be deducted.

Notes this mean it started  
2000 yds off at 7:47  
and was not noticed until 7:50

(70) continued

Interference: none when torpedos  
Bliss Ramah about 2000 yds off in 7 min

Time to reach torpedos { ① 3:29  
② 3:33  
③ 4:11 -

No 1 3516 yards Best

2 Doubtful - 3450 yds

3 2817

Loudest

hear

{ ① 6:20  
② 6:20  
③ 6:20

3000 yds  
before

Can't hear

{ ① 9:10  
② 9:05  
③ 9:00

Torpedo ran 4000 yards in. 3:47 $\frac{3}{4}$   
" " 7000 " " 6:30

Notes: ① and ② announced torpedos  
at 9:55 when no torpedos  
were running. ① hears one  
at 10:07.

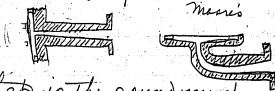
Must have come boat  
or thing mistaken  
a torpedo as all  
got it small enough  
they have been 4 times  
calculated

{ ③ announced at 10:24.  
① " " 10:26:10.  
" " " 10:24:15.  
② " " 10:28.  
① " " 10:50  
② " " 11:30

Mixed 5th shot. Was missing  
up lamps.

Mixed 6th shot - Did not  
see ball up & other  
signals.

These under water transmitters  
are now shaped -



that is the sound must  
enter a very small opening and  
expand to diaphragm.

Would they not be more sensitive  
if the diaphragms had larger  
openings to the water?

Mixed #5, & 6

(71)

Same as 70 except to obviate  
hearing each other yelling signals  
lamps were wired from the three  
and time taken from these lamp  
flashes.

Position: same as 70.

Shot #: 7

Time 1:27 PM

Wind - Breeze - few white caps  
Under water transmitters - 6000 yds off

Interference - none. ① 3:20

Time to bear towards ② 2:22

101-3667 ③ 4:57

2 - 2057 ① 6:54

3 - 2057 ② 5:00-7:15

Lowest ③ 6:52

143 ① 8:45

2050 yds with 1000 yds ② 8:25

Can't hear ③ 8:24

4000 yds 4:03 7000 yds 7:00

Notes: Last fair test.

#3 gave false signal ahead of

time.



This shows

- ① what outside interference in the shape of launch & waves would do
- ② The boys had been steadily looking pieces to ears and at attention for an hour and were probably tired.

When them became so high the Emblane stopped & went in.

Dawson says staying this long th. of time in closed up stuffy booth makes eyes dull & knocks the alertness out of all your senses —

The booth can easily be ventilated,

Same as 71 in all respects. 72

Position: same as 70.

Spot # 8

Time 2:36

Wind - High - White Caps - 2 ft waves

Interference Launch slop ran 30 yds off at 2 min masking test badly. Plus Launch 1000 yds at 7 min.

Time to hear

①	5:10	Arrived at 8:15
②		
③	6:36	Arrived at 10:00

Loudest

①	—
②	—
③	—

Can't hear

①	—
②	—
③	—

4000 yds 3:55 7000 yds 6:35

Notes:

- #3 - 1 false signal. Launch running 1000
- #1 - 1 " " Launch 5000 yds away
- #1 false " " Outer boat 1500 yds away
- #3 " " Launch 11 1200 yds

Capt of Emblanc says Torpedo gets  
her full portugal speed 500 yards  
after firing - Maximum speed  
5000 yards - 29 knots -

Chester hears Emblanc air  
Compressor all the time when  
at 4000 yards its a slow  
Thump & dont bother -

Chester says Motor Boats sound  
resembles the torpedos, also  
that there are other boats  
running besides Bliss boats  
which in future will be noted  
in log & approximate position  
by Hardy & an additional man obtained from  
192 crew

Chester says Emblanc has a  
Dynamo, 10 KW running all  
the time,

also at 4000 yards state  
he heard pump of 192  
going all the time

Chester says white Caps & striking  
of waves against boat being  
how do not bother hearing  
the high notes of the Torpedos  
but Motor boats interfere  
badly as notes have a  
resemblance -

72 feet  
A Power loop 30 yards  
away prevented hearing  
torpedos when torpedos was  
5000 yards distant approaching  
& Torpedos was not heard at  
all by Dawson, Moore  
or Chester - while loop ~~was~~  
was in proximity in fact  
not during the run as a Blues  
boat started up 7 minutes after  
Torpedos started,

8/30/17.

Get set up. Emblane came by.  
Jerry without seeing her detected  
at 1000 yards with #1 equipment.  
(see description later)

Jerry gets a note from  
Emblane which Dawson  
identifies as A# = 435 N.

Jerry hears 166 pulsations  
per minute, probably the  
speed of the Emblane's engine

at 8:10 a tug with derrick  
slow speed tug passed.  
This engine was running 160  
per minute. Jerry thinks it  
was this he heard and not  
the Emblane. The steam engine  
of the Emblane are evidently  
not as loud as the gas engine  
of this tug. This tug was  
moving on the same course  
as the Emblane but slower  
in speed.

8/30/17.

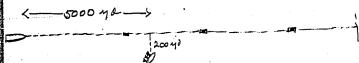
(78)

Comparative Test Between:

- ① = Moore's Microphone #2, connected to 1 stage audion with L. Bush (double filament, low amplification) 3000<sup>W</sup> ear pieces, Jerry listening.
- ② = Moore's Microphone #1, straight to pair of Bell receivers. Moore listening.
- ③ = 1000<sup>W</sup> - .002" wire receiver, to input of 4 stage audion set on high with shunt box at 0.80<sup>W</sup> angle receiver was Dawson listening.

Listeners did not know when torpedo was fired as all were below deck. Did not know when each other signalled as the signals were sent by lamp flashes.

(73 cont'd)



Position: 5000 yds from Embankment  
(estimated) 200 yds (est) off  
course.

Shot # 1

Time 9:10 am.

Wind moderate. no white caps.

Interference:

No launches running while  
torpedo was running to  
Rampant or while test  
was being made.

### Symbols

a dash between figures  
thus 4-05 means  
minutes & seconds from  
time torpedo is fired.

A colon between figures  
means hours & minutes  
of the day - that is  
O'clock.

### Three signals used.

Long flash = think I hear torpedo

Series of dashes = sure "

Series of dots = annuling & start over.

Jerry hears & identifies Bliss  
hannah 2000 yds away.

### (73 contd)

1750 yds. ① thinks 38% sure  
3-15 sec  
917 yds. ② sure 4-05 sec  
Time to hear ③ thinks 3-15 sec  
917 yds. sure 4-05 sec

4000 yds. 4-05 7000 yds.

### < Notes:

① thinks he hears at 9:47 am Bliss launch  
1500 yds off. ② sure he hears 9:50.

③ thinks he hears 9:51 am ③ annules.  
9:55 am

② sure he hears 9:52 am annules 9:54  
slow speed target. 9:54  
slow speed target. 9:54

① thinks he hears 9:03 am annules 9:06  
slow speed target. 9:06

③ thinks he hears 9:06. annules 9:07.  
slow speed target. 9:07

① thinks he hears 9:09 slow speed target. 9:00 yds.  
9:00 yds.

③ thinks he hears 9:09 " annules 9:13.

① annules 9:10 am.

74

Errors -

- ② at 9:30 Slow speed launch 1000  
400 yds off.
- ② annulled 9:33.
- ② at 9:34 Bliss Launch 1000 yds
- ① " 9:35 " " "
- ③ " 9:35 " " "
- ① Annuls 9:36.
- ② " 9:37.
- ① hears at 9:38 slow ops launch 1100 yds.
- ③ Annuls 9:39.
- ① " 9:39.
- ③ Hears 9:41 Bliss Launch <sup>starts</sup> 3500 yds
- ① " 9:42 " " 3000 "
- ③ " 9:42 " " " "
- ① Annuls 9:43
- ① hears 9:44 Bliss Launch 1000 yds
- ③ Annuls 9:45 " "
- ② Annuls 9:45 " "
- ① " 9:45 " "
- ① Hears 9:46 B. Launch stopped & started
- ② " 9:46 " " "
- ③ " 9:48 " " 300 yds off.
- ③ Annuls 9:50 " "
- ② Hears 9:52 B. Launch 1500 yds. 1000 yds off.
- ② " 9:59 B. Launch turning torpedos
- ① Annuls 10:00 ② Annuls 10:01

74

Same as 73 except that signal system is changed. The sure or confirming signal will be omitted and only the hear and annul signals used. Also "loudst" or when torpedo passes the Rampant will be recorded as this confirms the torpedo.

Position: Same as 73.

Shot # 2

Time 11:43 a.m.

Wind

Interference: Bliss Launch 2000 yds off at about 1/4 min.

Also running 2 slow speed motor boat at 3000 yds & the motor tug at 3000 yds.

(74)  
 ▶ Intermission here as we were hunting for lost tapes  
Errors continued:

- ① hears 10:04 Blue Lammah 300 yds.
- ① Annals 10:04
- #11 Lammah went by at 10:18. All say sounds almost exactly like a torpedo
- ② hears 10:21 Blue Lammah 5000 yds behind us
- ② annals 10:21
- ② hears 10:31 Blue Lammah 300 yds off
- ② Annals 10:32
- ② hears 11:02 Blue Lammah 3500 yds off
- ① " 11:04 " 3000 "
- ① annals 11:06
- ③ hears 11:25 Slow speed tug 300 yds
- ③ Annals 11:27 " " " " " " " "
- ① hears 11:32 Slow speed tug 600 yds
- ① Annals 11:34

Dawson says he heard it but thought was Lammah & could not distinguish.

$$4000 \div 4 = 1100$$

(74 cont'd)

1650  
 Time to reach { ① 3:07  
 ② 4:38  
 ③ —  
 366 yds

Lowest { ① 5:02  
 ② 6:10  
 ③ —

Notes: When this is put into practice the listener should be where he can see the sea so that his eyes can help his ears to interpret what is occurring.

4000 yds in 4 min 10 sec

Searching for lost tapes  
 off 4000 yds away accounts  
 for delay between sightings



Smoke bomb fired by Jackson  
① pit, moon obscured and lost  
behind.

Errors:

③ - 12:09 before fired

② - 12:09

U310 = 4:03

(75)

Same as 74 except V bulb  
more sensitive, more voltage)  
in single stage anodion.

Position same as 73.

Shot # 3

Time 12:10 P.M.

Wind: Brisk <sup>in gusts</sup> 18" waves.

Interference: Very slight 2 slow  
Speed launches 3000 yds away.

1993 — ① 3-01  
Time to hear { ② 20 sec before started

③ 30 " " "  
① 4-56  
② 4-56  
③ 4-55

Loudest

Notes:

Knew when ball was up  
this time.

Rauson says anodion were  
crackling from waves and  
he could not be sure until  
torpedo was very close  
Rauson says 3000 ft pair of ear pieces  
much better than 800 ft.

4000 yds in  
4 min 0 sec

Errors: none

(76)

Same as 75.

Position = same as 73.

Spot # 3

Time 1:04

Wind Moderates. 18 evanes but no white.

Interference: Bliss Launch 200 yds at  
5-30, masking badly. Another Bliss  
Launch 400 yds away at 4 min.

Time to hear	①	4-30	500 yds
	②	3-57	
	③	5-00	
Loudest	①	5-17	
	②	4-50	
	③	—	

Notes:

4000 yds. 4-04

Bliss Launches masked badly  
this time.

On last two torpedoes Jerry tried  
revers with resonating tubes with  
negative results. Not as loud and  
could not time so as to resonate

# Errors:

- 1500 yds away.
- ③ hears at 1:28. Launch (small) about
  - ③ annuls 1:30.
  - ① hears 1:30 Launch 1500 yds away.
  - ② " 1:31 " " "
  - ① annul 1:33
  - ② annuls 1:34
  - ① hears 1:35 <sup>Relies on annul 3500 yds.</sup> Launch 1500 " "
  - ① annuls 1:37
  - ① hears 1:39. <sup>Relies on annul 7500 yds.</sup> Launch 1500 " "
  - ① hears 1:41 " " 1600
  - ② annuls 1:41
  - ② hears 1:42. <sup>Relies on annul 700 yds.</sup> Launch 1500 " "
  - ② annuls 1:45
  - ① hears 1:51 nothing in sight.
  - ② " 1:52
  - ① annuls 1:53
  - ② " 1:54
  - ② " 1:57 until torpedo running.

(77)

Same as 75.

Position - same as 73.

Shot #4.

Time 1:54 P.M.

Wind moderate. Few white caps.

Interference: none at start.

at 4 minutes. Launch starts at 1000 yards.

Time to hear { ① 2-54 — 2100 yds  
② 3-47 — 1016  
③ 3-48 — 1016.  
① 5-14

Loudest { ② 5-19  
③ 5-24

Potas: 4000 yds. 4-10

① signalled 1 min 05 sec after annulled in 2 min 30 sec

More & Jerry state that quiet of wind on the ropes which suspend their microphones dislurch them with external noises.

Use pipes

Errors:

none

(78)

Same as 74. Jerry uses L or less - sensitive buib. again to verify.

Position Same as 73.

Shot # 5

Type 2:32 P.M.

Wind Moderate - few white caps.

Interference: - Slow speed sleep with gasoline engine 1500 yds off at first after 4 minutes Bliss Ramak started to compare

Time to hear { ① 3-15 1750  
② 3-36%  
③ 3-53

Loudest { ① 4-57%  
② 5-19  
③ 5-04

Notes: 4000 yds 4:00

The interference was not bad. Do not know why we do not catch it as early to day as before unless it was accident before or the men grow tired and dull from being at constant attention.

## Errors:

None.

Believe lack of errors on this & previous experiment due to firing being rapid & close together.

Men don't get chance to be alone - nerves on edge from waiting and therefore hear things.

One difference to day from yesterday. Water about 47 ft deep yesterday. Does not show on chart but is 42 ft deep today at 5000 yards.

Same as <sup>(79)</sup>74.

Position Same as 73.

Spot #6

Time 3:47

Wind Moderate - few white caps

Interference: Bless Bunch running by at 200 yds when fired. Slow speed  
slip 2000 yds off & ran across course.  
Very bad interference.

Time to bear { ① 3-21 1650 yds  
② 4-06  
③ 4-30 1/2  
④ 5-25  
⑤ 5-41  
⑥ 5-16

Forecast

Notes: - 4000 yds - 4-16

Interference very bad this time.

Jerry tried resonator. Could not tune to any particular note.

### Errors:

- ② - 3:27 hours - 2 launches  
⑦ annals 3:27

Same. as 74. (80)

Dawson lit receiver down deeper  
more made microphone a little more  
sensitive.

Position same

Spot #7

Time 3:27 Pm.

Wind moderate - very few white caps.

Interference: Blue launch 200  
yds away when torpedo started  
Kept running 4 min. launch started in 4 min

Time to hear { ① 3-07½ 1883.  
                  ② 3-32  
                  ③

Loudest { ① 5-10  
            ② 5-21  
            ③

Notes: 4000 = 4-06

Dawson's audions gave trouble  
noisy & knock. Batteries which  
had been put on fresh dropped  
in voltage so that too low  
and did not have time to act  
in another ear.

→ 2 per second.

Jerry says sound was  
like exhaust of factory  
engine - puff-puff.

Average of all Jerrys  
Reading. Except the Bliss  
launch one 200 yds away

1894 yards SW -

42 ft. water - was gathered  
by rope vibrating -

Invention bulb 1 stage  
inclusion - microphone -

(81)

Test to see who can first  
hear Emblem and describe  
what sounds like

Moore hears Emblem at 2000 yds.

Bliss launch 300 yds off &  
interferes

Dawson hears Emblem about  
same time...

At 1000 yds for Emblem, Jerry  
says launch at 400 yds  
going away so loud masks  
the Emblem. Launch sounds  
like locomotive going away.

Jerry hears Emblem at 400 yds  
launch at 1000.

Moore now says he heard launch  
and not Emblem. Just hear  
Emblem at 400 yards.

Jerry says speed of Engine 180,  
per minute.

Moore says speed 2 per second.  
and describes sound as of  
waking beam of ferry about  
2 1/2 seconds apart. With this  
heard another sound about

Emblane Engin

240 Rev

Triple Expansion Eng  
single screw

Pump: about 30

Centrifugal pump for  
bilge -

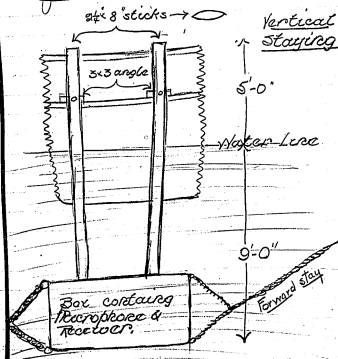
Forced draft fan - high water

Generator 550 Rev  
91 segments in

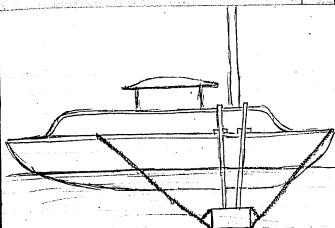
Commutator 4 poles →

9/7/17.

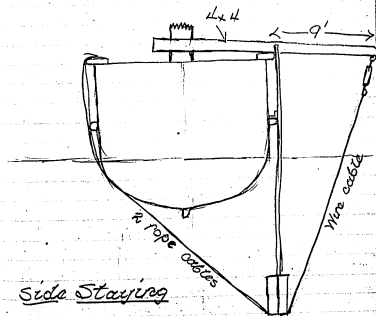
Test of Moore's #2 microphone  
and regular #2 receiver in  
float attached to Rampant.



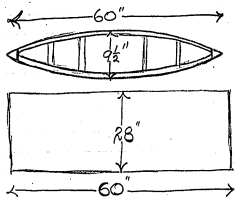




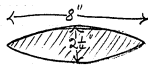
Tore and Aft Staying



Side Staying



*Detail of boat.*



*section of vertical staves.*

9/7/17

(82)

Place Gardiner's Bay, off  
windmill on N.W. shore.

Weather Rough early in morning.  
Light wind, no white  
caps at time of experiment.

Rigged up boat with Morse's #2  
microphone to single stage  
audion and pair of Bell  
receivers. Also with regular  
#2 receiver to input of 1st stage  
audion, output to 3rd ohm  
receivers.

Tested out without engine  
running with bell. Both  
quiet and sensitive.

Started engine running. Both  
very noisy.

Started boat. At 4 miles per  
hour, steel cables vibrated so as  
to make loud, low pitched note.  
At 8 mi. per hour vibration so

violent had to stop.

Loosened all cables but kept engine running. Still very noisy - too much so to use.

Took all staying cables off leaving only the vertical stays. With engine running still too noisy.

This shows that the microphone can not be rigidly affixed to the boat as engine and other vibrations are thereby transmitted to it.

In the previous vertical stays used iron straps 5 and 8' long holding the 4"x4" uprights formed, which though heavy & stiff themselves, acted as springs because of the great mass (probably 400-500 lbs when full of water) of the boat holding the microphone.

9/12/17-

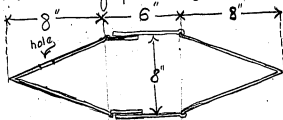
(33)

Place Chungking Harbour

Weather - Very quiet. Beautiful almost calm.

Object - To find the towing qualities of various shapes of containers for Massey Microphone.

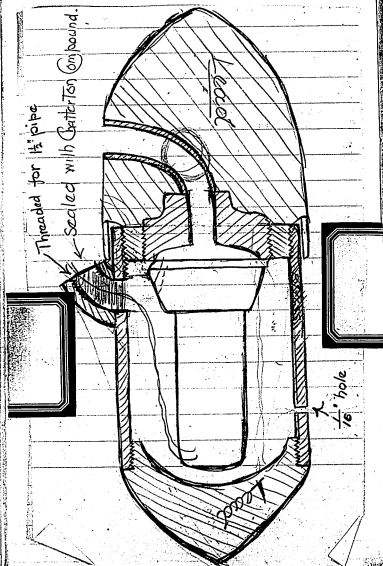
Jerry had tin-smith make up containers of galvanized iron.



- ① Boxed hole as shown put rope through and towed from row boat at about 2 1/2 miles per hour.

Container tilted up up at bow, but kept stable; did not tend to rotate or jump from side to side.

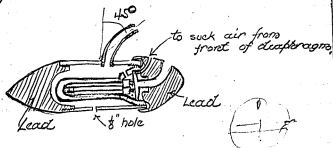
- ② They took ashore and filled with sand and gravel. Showed more resistance reducing speed of row boat to about  $\frac{1}{2}$  to  $\frac{2}{3}$  miles per hour. Jerry could not see but from alternate jerks at towing rope judged it was jerking from side to side.



9/15/17.

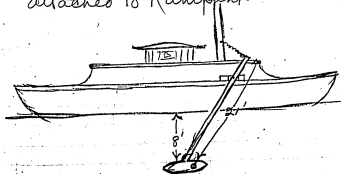
(84)

Test of stream-line container  
for 1000 ohm receiver.



First tested out 1000 ohm  
receiver & found working OK.

Then assembled on 1 1/2\"/>

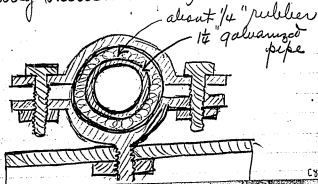


They tested out as input of  
4 stage audion

On test with bell found circuit  
very quiet - better than ever heard  
it before, also sensitive and  
accurate. The overtones of the  
bell were clear, as I never  
heard them with audions  
before.

Tried thumping on desk.  
~~Found the sound was transmitted~~  
to the 1000 ohm receiver.

Put rubber between clamp and  
pipe to prevent vibrations  
being transmitted to receiver.





This deadened the vibrations  
from deck to some extent  
~~but not completely.~~

Then started engine of Rampant.  
Engine noise loud in outlet  
arc out of audions.

Then ran Rampant in inlet  
out of Green.

The pipe and container  
carried nicely, and pulsing  
on the boat carried at an  
angle of about  $40^\circ$  with  
the water.

Made however an incessant  
grapevine roar. Could not  
hear engine or any other  
noise for this roar.

On listening to end of pipe  
and close to water this  
roar seems the amplified  
sound of the push of the  
pipe through the water.

The lead painted container seems very good. Makes the receiver quiet and sensitive. Lead seems a good deadener of high frequency vibrations.

The rubber padding between tube and deck supports seems to absorb vibrations from deck to tube to some extent.

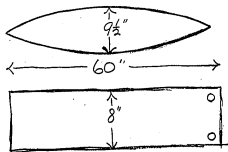
The water swirling around the  $1\frac{1}{4}$ " pipe makes considerable noise even at 7 or 8 miles per hour ~~the~~ vibrations of which are conveyed to the receiver as a continuous roar.

It may be possible to put a flexible connection between the container and pipe and get rid of a great deal of this noise.

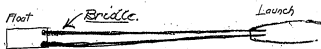
9/17/17.

Test of float

(85)



Float rides  
curved side  
down.



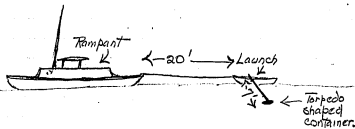
- ① Towed float about 10' behind launch. Launch running about 6 miles per hour.

Float ran submerged but shifted from side to side.

- ② Then lengthened to about 25 ft. Float remained submerged and continued to make from

side to side.

No ballast was put in float.  
It had holes so that it contained  
water.



Torpedo shaped container of  
pewee fastened to side of  
Launch & towed by Rampant.  
Container fastened to  $1\frac{1}{2}$  tube,  
roped to side of Launch.

1000<sup>w</sup> pewee connected to input  
of audions.

① Listened in Rampant stile,  
Output very quiet and seemed  
sensitive

- ② Listened in with engine of Rampant running, ~~elstat~~ out & boat not moving.

Could hear engine quite plainly - Loud.

- ③ With Rampant under way about 8 mi per hour.

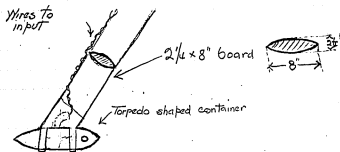
Noise very much increased so much so that other sounds could not be distinguished.

- ④ Rampant under way with engine stopped entirely. While at any speed noise still quite loud, noise diminished with speed.

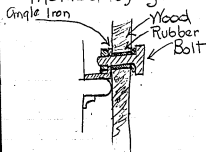
9/18/17.

(86)

Test drawing Torpedo shaped container through water with stream line board.



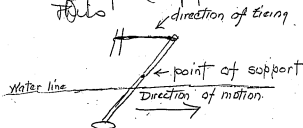
Method of fastening to Rampant.



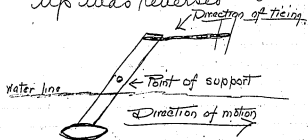
Note

Stream line of plank diminished friction to a considerable degree, as compared with round pipe.

Both hung at 45°  
With pipe it was necessary to pull backward on top of pipe supported below this



With wood direction of tying up was reversed



① Tested with engine of Rampant still.

Audions very quiet, sensitive.

② With Rampant's engine running but not under way. Could hear engine in audion plainly but not as loud as with iron pipe formerly used.

③ Rampant under way. Quite noisy. Not as much as with iron pipe formerly used but still too noisy for service.

④ Rampant under way but with engine stopped. Not as noisy as with engine running but still too noisy for service.

This noise could be heard by putting ear to top of wood. Noise due is due to rush of water.

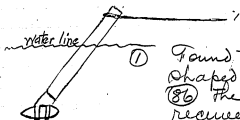
Jerry describes this noise as the  
tinkling of dropping water and  
this is greatly amplified by audions.



9/19/17.

(86)

Attempts to get receiver container mounted on board to tow without sound conducting fastening to transport.



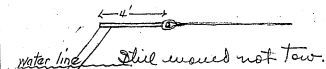
① Found that with shaped plank as (86) the plank with receiver floated and balanced upright in water.

② Then tried towing dragging with rope as shown above. Would not tow but could balance with hands so that it would tow.

③ Nailed stick about 4 ft long on top as shown

Notes:

When



- ④ Then tried cutting angle of board on top so as to be parallel with surface of water when pushing. Still would not tow

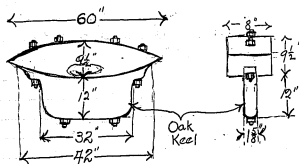
except when managed by hand.

Note - Boat heads are  
above surface of float.  
This was built rough,  
to use material on hand.  
- not smoothed up. →

9/19/17

(87)

Towing Float is (85) with keel.



Float as used in (85) fitted  
with  $12 \times 42 \times 1 \frac{1}{2}$  oak keel.

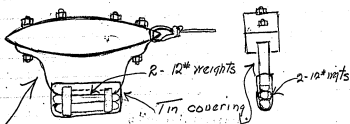
The float portion  $9 \frac{1}{2} \times 60$  is  
perforated and fills with  
water.

Jerry towed this model behind  
launch, running at about  
4 miles per hour.  
Model submerged, towed  
steadily without pumps  
sidewise or vertically.

Note - Surface of float  
and keel ROUGH -  
and with facets etc.  
projecting →

(88)

Towing Float with weighted keel.



Same as (87) except, 2; 12# cash weights  
fastened to bottom of keel and covered  
with sheet tin.

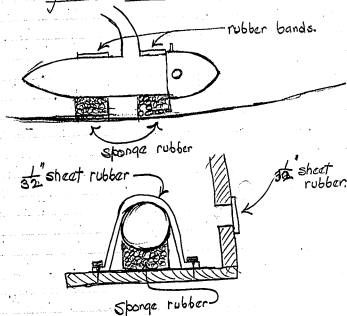
Towed behind launch at  
about 4 miles per hour.

Stayed under water and  
towed nicely without jumping  
either horizontally or vertically.

9/30/17

(89)

Listening to sounds with float towed as in (88).

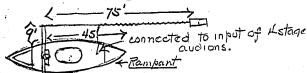


Details of fastening torpedo shaped container to float.

Same float as in (88) except that the covering of weights was removed.

9/21/7

(90)



Method of towing float from Rampant

- A When running slow, about 5 miles per hour, float was submerged, rode steadily. Jerry could hear sound of Rampant's engines running with cluck out but very little other noise.
- B Then speeded up, about 8 miles per hour, before the float came to surface, engine noise increased but very little other noise.

After running a minute or two floats surfaced came to surface and turn over. noise then very great

90 continued

Tins were then placed on the sides of the float to hold under water while under way. These were of wood  $4" \times 12" \times \frac{1}{2}"$  placed about 12" from bow of float at angle of about  $15^\circ$ .



- C Float was towed with 75ft rope.
- At 4 miles per hour remained below surface, rode smoothly. Heard engine of Rampant. Very little other noise.
- At 8 miles per hour. Remained below surface. Rode smoothly. Heard engine of Rampant very little other noise. With engine of Rampant stopped. Very quiet. Could hear launch 600 yds away.

D. Then let out about 200ft  
rope.  
Rode smooth at 8 miles  
per hour under surface.  
Engine of Rampant as loud  
and plain as C.  
Stopped engine. Very  
quiet. Heard launch 1000  
yds. away.

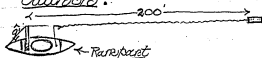
This float was very crude.  
Boat heads and other  
projections to make ripples.  
Even with its projections it  
proved that at 8 miles per  
hour the noise of drawing  
the reevers in a float or  
container could be eliminated.  
Noise of engine of Rampant  
was not eliminated.  
A steamer will however have  
very much less engine noise



9/22/7

(91)

Determine how far can hear  
Launch.



Towed float holding 1000<sup>00</sup> receivers  
connected to input of audions  
200 yds from 9' boom on Rampant.

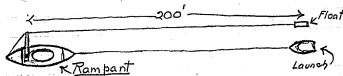
Dropped launch at Jennings Point  
(Shutter Island Sound). Ran  
1500 yds (determined from map)  
away, stopped engine of Rampant  
and listened for launch.

Jerry could not distinguish  
launch but could hear plainly  
an oyster boat about 800 yds  
away.

9/22/17

(98)

To determine how float  
rides at speeds and at  
what depths.



Observed float from Rampant  
towed close to float.

at 4 miles per hour (estimated)  
float ran  $1\frac{1}{2}$  to 2 ft under  
surface and dived up and  
down slowly.

at 8 miles per hour (estimated)  
float ran 6 ft under surface  
and ran very even & smooth.

9/23/17.

(93)

- A. Mr. Edison listened to engine and noted engine noises then listened in ~~on~~ audions with input connected to 10000 receiver torpedo shaped receptacle in towing float as in (89).

Said that the audion noises did not correspond to the engine noises and were, therefore from some other source, possibly from the shaking of the audion bells due to vibration of boat.

- B. Directed that the diaphragm be removed from the receiver to determine whether this noise was due to vibration of audion bells from shake of boat or from air and other noises picked up

outside.

Removed diaphragm and connected receiver to input of audions and started engine. Found no pronounced noise except clear cut clicks, twice the number of revolutions of the engine.

On disconnecting one of the make & break wires these clicks changed from

to -----  
and are probably due to the magnetic inductive effects of the make & break coil as these contacts are made.

9/23/17

(94)

Test to determine speed of  
Rampart.

Run between Breakwater off  
Youngs point and red buoy off  
Fanning point in Newport  
Harbor, there scale 2000 yds on  
chart.

1. Test - With wind and tide.

Made 2000 yds in 8½ min.

Average Engine Speed 254 R.P.M.

= 1760 yds in 7½ min or 8 miles per hour.

(Engine missing)

2. Test - against wind and tide

Made 2000 yds in 12 min

Average Engine Speed 237 R.P.M.

= 1760 yds in 10½ min or 5¾ mi. per hour.

(Engine missing badly)

3. Test, slow speed - with wind and tide

Made 2000 yds. in 13 minutes

Average Engine Speed 159 R.P.M.

= 1760 yds in 11.44 min or 5½ mi. per hour.

This gives Rampant speed of  
6.8 miles per hour in still water  
as speeds run, or taking bath  
at 2.54 P.M. = 7.1 miles per hr.  
With engines running well, Rampant  
will make about 8 miles per hour  
at full speed.

Wind and tide apparently amounted  
to 1.8 miles per hour.

Taking lowest speed at 5.25 miles  
per hour with wind & tide gives  
Rampant 3.45 miles per hour  
at lowest speed.

Will repeat these tests when  
engine is running good.

(95)

9/23/17.

Towing Float with Long Line.

Let out float without reevers on long line.

At 300 ft - pull 180# per second

At 500 " - " 240# " "

At 1000 " - " 300# " "

about 4 ft under surface.

The pull is estimated by Jerry from number of men to pull in.

Rampant was run at full speed or about 7 miles per hour as engine was running badly.

With 1000 ft of line out the speed of Rampant is noticeably reduced.

9/24/17.

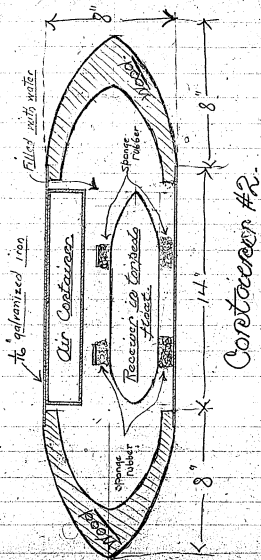
Worked on engine of Rampant.  
Jerry found exhaust valve of  
1st cylinder out of time and  
corrected. Also found valve  
needed grinding.

Left Sag Harbor. Engine ran  
270 R.P.M. and showed good speed.  
Later Lawrence slowed up and  
showed 1st cylinder clipping.

Between 1st buoy in Noyack  
Bay and Red Buoy off Paradise  
Point, 3350 yds took 18 min at  
2316 P.M. or at 6.3 miles  
per hour.

An getting in took out exhaust  
valve of 1st cylinder and  
found it tight. Decided to  
grind valves of Rampant's  
engine.





9/25/7.

Worked more on Rampant Engine.  
Got container #2 from Mead  
ap-ohite.

Had wooden ends which were  
sectional, held together with  
nails and painted. Replaced  
in torpedo float put in  
place. Extension tube made to  
suck out air.

On Run of Rampant, made  
270 R.P.M for few minutes. Then  
stopped, ran slowly & speed  
down to 230 R.P.M.

Ground all valves. Got jump  
back to work.

9/26/17.

Jerry took out strainer of Carburetor and found clogged. Cleared and put back. Testd engine and ran speed as high as 350 R.P.M. while under way.

Made speed test of Rampant between breakwater and red buoy off Fanning Point - 2000 yards.

① East - 2000 yds 6 min 45 sec. Av. Eng. Spd. 299.

② West - 2000 yds 9 min 29 sec. Av. Eng. Spd. 303.

① 2000 yds in 6 min 45 sec = 1760 yds in 5 min 56 sec  
or practically 10 miles per hour

② 2000 yds in 9 min 29 sec = 1760 yds in 8 min 20 sec  
or 7.7 miles per hour

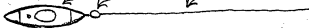
Average in still water 8.6 miles per hour.

9/26/17

(95)

Resistance of  $\frac{3}{8}$ " sash cord  
to towing

Rampant, Scale, Sash Cord



Rampant running about 8.6  
miles per hour less than of the  
pull of the cord.

500 ft cord  
800 " "  
1000 " "

45#  
85#  
92#

then towed the float used in

(88)

With about 1000 ft of line cut  
and before Rampant had  
gotten up to full speed line  
broke and line and float  
were lost.  
Scale showed 480# on break.

9/26/7.

(95)

Towing Container #2

Container #2 was fitted up and towed. Fastened with  $\frac{3}{8}$ " dash cord as shown



Tumbled and rolled badly.

Keel, 4" broad by 14" long of  $\frac{1}{8}$ " galvanized iron was soldered to bottom.

Turned upside down and tumbled as bad as ever.

2-side fins 3" wide by 10" long were soldered to sides in addition to keel.

Turned sideways and plunged.

Keel was then removed.

If started right side up  
swims down to surface and  
plunge up and down like  
a porpoise.

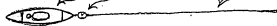
If started up side down would  
try and stand nose up  
in water.

9/27/17.

(97)

Strain of towing  $\frac{1}{2}$ " tarred  
Marilla Rope.

Rampant Scale  $\frac{1}{2}$ " Marilla rope



Rampant at full speed about  
8 miles per hour

500'

-

58#

1000'

-

107#

(98)

Towing Launch.

Rampant full speed, about  
8 miles per hour

Full of launch

155#

9/27/17.

Towing Container #R.

With Rampant at full speed  
about 8 miles per hour.

Pull with 120 ft line and  
wire = 20#

(100)

Change of Fire on Container  
#R.

A Took off all fins of  
yesterday and put on  
crossed fins on tail



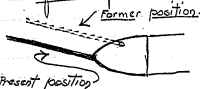
Towed steadily but came to  
surface.

- B. Side fins on tail turned down  
to make bow dive.



Container turned over and  
ran sidewise.

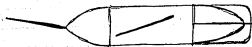
- C. Then changed towing rope  
from point on top to nose.



Container ran right side  
up, smoothly but came to  
surface

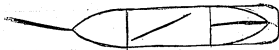


D. Added inclined side fins  
to force under water.



Container ran smoothly  
about 6" to 1 ft under  
surface.

E. Inclined horizontal tail  
fins to throw tail up  
throw down

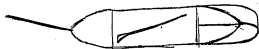


Container ran smoothly  
about 2 or 3 ft below  
surface.

Note - It is evident that for towing models the fins and weights must be arranged so that

- ① It will remain upright, that is will not roll.
- ② Will not drift or plunge vertically or horizontally.
- ③ Will ride parallel to surface of water.
- ④ Will ride at even depth which should be at least 5 or 6 ft inland or smooth water and probably deeper, about 12 ft for open sea.

F Inclined front tips  
of side fins downward.

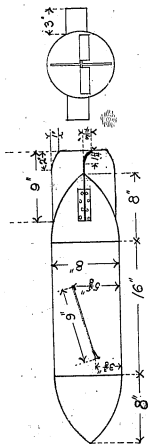


Container ran evenly 5 or 6 ft below surface which is what is desired.

This model is now satisfactory as it rides smoothly & evenly at the desired depth and with only a small resistance - about 30#. Its shape and size are convenient.

G Then connected up to Audions.

At first fairly quiet, could hear some engine noise. Then became noisy



Details of Fins on Container #8.  
Scale = 1/8 size.

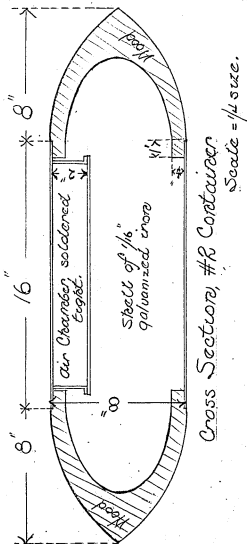
could still hear engine noises  
but with crackles & roars.

Tested out and found grounded.

E. M. T. of testing battery 134 Vols  
" one side to ground 110 "  
" other " " 120 "

Mill dry out, test out and  
locate ground.

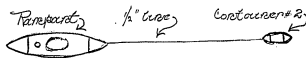
Found ground in primary. Sent  
Stanley to Orange with it to  
clear and insulate.



9/28/17

(10)

Test, towing Container #2  
on  $\frac{1}{2}$ " Manilla Line.



Ran Rampant at full speed  
about 8 miles per hour.

550 ft of line out = 100# pull  
1000 " " = 150# pull

Container #2 ran perfectly steady  
and with this long rope,  
Jury estimates 20 ft under  
surface.

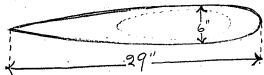
Will adjust to run less deep.

9/29/17.

Found that the air chamber of #2 container leaked and was half full of water.

Emptied it and after resoldering two or three times, soldered up so that it would remain under 30 ft of water 24 hours without leaking.

Jerry had wooden stream line model made 29" long, 6" diameter



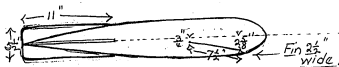
hollowed out inside.

Sent Frank and Earl after the hydraulics. Running short handed.

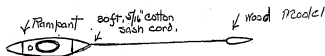
10/1/17.

High winds, clouds and some rain.

Rigged up wooden model with tail and side fins —



### Towing <sup>(102)</sup> Wooden Model.



About 10# lead was put in cavity.

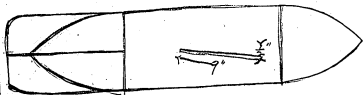
Model still floats, but with fins under water.

On towing at about 7 to 8 miles per hour, model towed well, did not tumble <sup>or turn</sup> rotate but had slight sideways, and remained about 3 or 4 feet under surface.

(103)

Towing Model #2 with small  
fin inclination.

Fins on #2 were changed so that the tail was straight and side fins had inclination of about  $1\frac{1}{2}^\circ$  in  $9^\circ$ .



Let out about 150 ft of line.  
Ran just below the surface

Now have this make towing  
50 ft below surface, too deep,  
and at surface, too shallow,  
both, right side up and  
without tumbling or jumping  
which seems to show that  
there will be no difficulty  
in making a model which  
will tow at right depth  
properly.

Weather too rough and crew  
too short to make depth  
measurements. Will do this  
when hydraulic comes.



(104)

10/2/17.

Tests with Hydraulic.

Log tests.

Going towards Grosvenor's Bay, against tide, towing launch.

1 mile by log in 7 min 05 sec = 8.5 mi per hr

Towards Greenport on way back

towing launch -

1 mile = 7 min = 8.6 mi per hr

1 " = 6 " 05 sec = 9.87 " " "

1 " = 6 " 05 " = 9.87 " " "

2 " = 12 " 20 " = 9.74 " " "

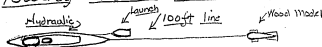
2 " = 14 " 30 " = 8.27 " " "

It is evident that the speed of the hydraulic varies so that the log is inaccurate.

Log showed 10 miles from Greenport to point off Wald fort where the Van. This scales on map 10 knots so that the log seems to read knots, not miles.

(105)

Towing small wooden model.

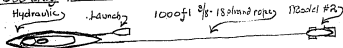


Speed of Hydraulic towing  
Launch 9 miles per hour.

Small wood model, towed fairly  
well, apparently 4 or 5 ft below  
surface, ran even vertically but  
made slight dives horizontally.

(106)

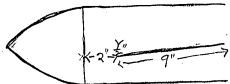
Towing Model #2.



Speed of Hydraulic, towing launch  
9 miles per hour.

Model #2 had fins with 1/2 inch

in 9 inches inclination downward.



Before hydraulics got to speed, Model 2 ran below surface and gave pull of 280 #.

At full speed, came to surface (just awash) and reduced pull to 230 #.

Proved that inclination of fins was not enough.

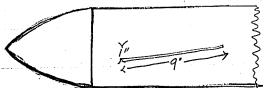
10/3/17

(107)

Adjusting Fins to get proper depth.

In ⑩ #2 row too deep and in ⑩ not deep enough. It is therefore possible to find a fin inclination at which it showed from at proper depth - believed to be about 6 ft for inside waters and 12 ft for outside waters.

Changed inclination of fins on #2 to 1" in 9".



Towed this behind "Hydraulic"  
as in 106.

Speed of Hydraulic 1 mile in 5:48  
= 10.4 mi. per hr.

Pull = 320 #

I dropped off inannah to see  
how deep the model was  
below the surface. Could  
not see it but from the  
angle of the rope estimated  
about 12'. It rides even,  
does not jump vertically  
or horizontally.

In this case the 1000 ohm  
resistor in torpedos shaped  
case was fastened in #2  
model.

This at the bottom as weights  
and the air chamber on top  
seems to make this tow upright  
without fail.

Test of insulation of receiver  
and wire to ground.

Connected reel to B battery (180 volts)  
insulated opposite end and dropped  
overboard (about 850 ft wire)  
Showed static kick on voltmeter  
but no steady deflection. Insulation  
O.K.

Then connected to receiver in  
model #2.

40 volts deflection one side  
20 " " other  
showing ground in receiver.  
This mobile model #2 was on  
deck.

Took receiver out of model 2  
& tested out. Showed small leakage  
at first with wet wires which  
diminished as wires dried out  
showing that this leakage was  
along the surface of the wire.

Then tested receiver in torpedo shaped case in bucket of water. Showed only leak was on outside of mine.

Then made new joints and dropped #2 and mine overboard.

Showed 2 1/2" vacuo deflection that is slight leak to ground. As this is the best mine we have mine have to try as it is.

Then connected up to Audion input and put overboard. Shows only a little noise. This a sort of continuous roar.

Sucking the water out now presents a problem as the towing model hangs upright except when under way and then becomes horizontal

Another problem in design will be whether the model should have a positive or negative buoyancy.

Believe that a very slight positive buoyancy will be best. One which will immerse the receiver but allow the towing model to just come to the surface.

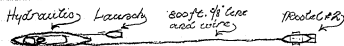
In this way it may be sucked out easily and raised float to the surface if lost or breaks away.



10/8/17

(108)

Test of towing model for  
noise.



- ① Let out model #2, with #19 twisted, rubber covered wire on 500 ft.  $\frac{3}{8}$ -18 strand hemp line.

At low speed, about 4 miles per hour, somewhat noisy - predominating was a pushing sort of roar - could hear also each beat of the 3 cylinder engine one louder than rest.

At high speed (about 9 miles per hour) this pushing roaring noise increased and engine noise increased proportionately. There

came in addition a slight  
grrrrrr, somewhat like a  
toledo.

Slowed down and let out  
800 ft. rope and wire. (all  
wire was had in one piece)

At 800 ft. low speed, noise  
seemed less than at 500  
but about same character  
except that engine noise  
was not quite so much.

At full speed (Made 1 mile  
in 6 min. 43 sec.) = 8.8 mi  
per hour. The noise again  
increased. Engines not quite  
as loud as before.

Then had engine stopped.  
Engine noise stopped. All  
noises diminished as speed  
of boat diminished, and  
until practically still when  
bumping noises showed the  
boat was hitting bottom.

On drawing in, had picked up two long pieces of kelp.

Recess showed O.K. no water behind diaphragm.

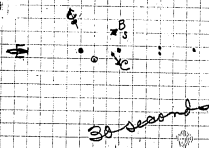
Next time will take

- ① Bridge to measure insulation resistance
- ② Btl to measure sensitiveness
- ③ Take up with Mr. E placing of hole and front find to avoid noise.
- ④ Making totally wooden model to avoid noise of metal shell.
- ⑤ Test tomorrow effect of hole by plugging and unplugging.

Method of depth test of running  
Tighten up engine to stop knock  
Time to get proper depth

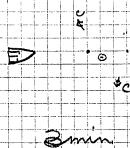
[ITEM(S) FOUND IN BOOK]

Exp. 74-1 - 8/30-17.  
30 sec

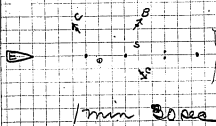


A = Bliss Boat.  
B = Gas, tow boat.  
C = Slow Mot. Boat.  
D = High Speed M.B.  
S = Sachem  
o = This boat.  
E = Emplane  
below (at mark)

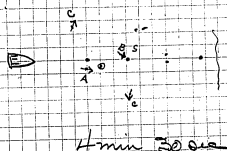
Exp 74-3 Aug 30-17



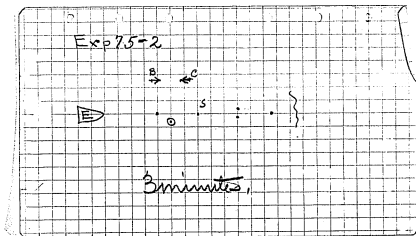
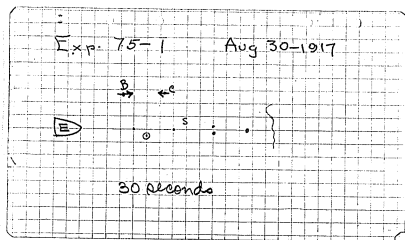
Exp. 74-2 8/30-17  
1 min 30 sec



Exp 74-A 8/30-17.



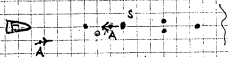
[ITEM(S) FOUND IN BOOK]



[ITEM(S) FOUND IN BOOK]

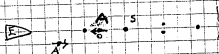
Exp 76-1-

8-30-17



atlas

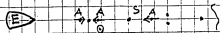
Exp 76-2 - 8/30-17



1/min: 30 sec

Exp 76-3

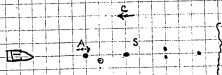
Aug 30-1917



1/min

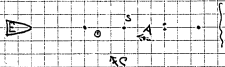
[ITEM(S) FOUND IN BOOK]

Exp 77-1 - 8/30-17

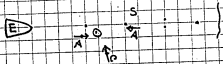


4 minutes

Exp 78-1 Aug 30-1917



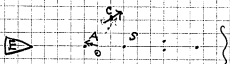
Exp 78-1 Aug 30-1917



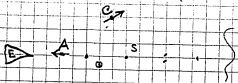


[ITEM(S) FOUND IN BOOK]

Exp 79-1 Aug 30-1917



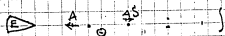
Exp. 79-2 Aug 30-1917



[ITEM(S) FOUND IN BOOK]

Exp 80-2

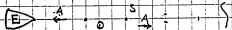
Aug 30-1917



Ammin

Exp 80-3

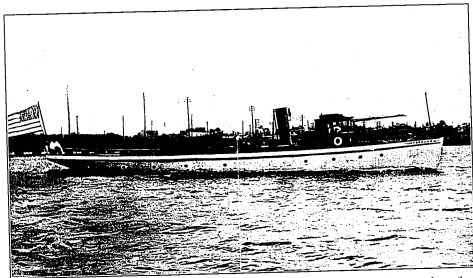
Aug 30-1917



Ammin

[ITEM(S) FOUND IN BOOK]

*Private Excursion Yacht "HYDRAULIC"*



Fast Steam Yacht "Hydraulic" for charter by day or night. Comfortably furnished, expressly for private excursion parties.  
An excellent boat for Moonlight Sails up the Hudson or on the Sound. Fitted with awnings and electric lights.  
Has two cabins. Rates reasonable.

For further particulars write to the owner  
MAX ZWICKEL, c/o Steam Yacht "Hydraulic," 15th STREET DOCK, HOBOKEN, N. J.

**Notebook Series -- Notebooks by Experimenters Other Than Edison  
Navy and Wartime Research Experiments -- A. M. Kennedy Books  
Notebook, N-17-10-04.1**

This notebook was used by Absalom M. Kennedy during October-November 1917 for notes on experimental work for the U.S. Navy performed under the direction of Edison during World War I. The experiments, which relate to submarine and torpedo detection, focus on how best to encase and tow a detection receiver behind a ship. The tests were conducted aboard the USS *Hydraulic* in Long Island, and efforts were made to avoid interference from other vessels. Included is a transcription of a telegram about the experiments sent to Edison in Washington, D.C. The notes indicate that James M. Burns, John A. Hanley, Joe Meilner, and Sherwood T. (Sam) Moore assisted with the work. The front cover is labeled "Experiments #6 From Oct. 4 to Nov. 2, 1917." The pages are unnumbered. Approximately 120 pages have been used.

Here used is

B+S #19-

Plain Pair Potholes Here, Simplex.

*Three Improved  
from 617  
Circuit  
Muley, Big  
New York  
Conn.*

75428  
*Home Co.,*

MFG. STATIONERS,  
96 JOHN ST.  
AND  
19 PLATT ST.  
NEW YORK.

Get

Spring Balance testing to 50#

X Class wire for towing small motor  
{ Pair low resistance lead  
recorders for use with 1-stage  
audions

10/4/17.

Measurement of ground  
resistance of Receiver.

Receiver used yesterday was disconnected from long wire, & put in bucket of water. Showed only 3000 ohms resistance to ground.

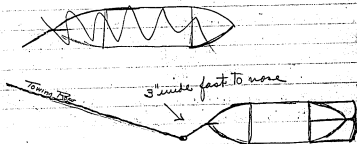
Had Stanley take this one out, and put new magnets in case. After assembly, this showed over 1,000,000 ohms resistance.

Put in bucket of water over night to see if dampness would affect insulation.

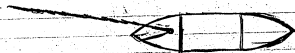
R=9370  
 $\frac{1}{4} = 100,000 +$

Moran's Model  $4\frac{1}{2} \times 6 = 8\#$   
 Torpedo model  $3\frac{1}{2} \times 13\frac{1}{2} = \#$

Suggestion to get fins away  
 from metallic body



So as to make depth automatic  
 with pull or strain -



As the pull increases the angle  
 correspondingly increases and goes deeper.

10/5/17

# Measurements of resistance of Red Receiver.

Receiver left in bucket of sea  
 water over night -

Resistance of coils 987 ohms  
 " to ground more than 1,000,000 "

Stanley will put this in model #2  
 and smooth up this model for  
 towing.

Engineer getting new pins in  
 links of engine to run smoothly.

These were completed for engines  
 2 and 3.

Made tests on small wood  
 towing model to try and find  
 better position and shape for  
 side fins. Found that if these  
 fins were carried farther front  
 their size could be materially

#1 - 980  $\omega$ . - much wire  
#2 - 834 out wire.

reduced and the fuel correspond-  
ingly reduced.

Manly reassembled and  
reinsulated pressure.

Coils = 834  $\omega$

Insulation - about 1,000,000 ohms.

---



Note:

In designing towing models the following points should be observed -

- ① Model should be balanced in still water so as to normally float on even keel.
- ② Fins and rudders adjusted so that the forces acting on the model while under way tend to keep it on an even keel.
- ③ It is evident that the front fin, which counterbalance the upward pull of the rope while at speed, should be as far forward as possible, preferably at the point of application of the rope.
- ④ The model should have a slight positive buoyancy but very slight so that the only force required to keep under water will be that of the forward fins pulling down on the rope.
- ⑤ Should have buoyancy on top and weight at bottom to support in stable vertical position.

10/6/17.

Next out with hydraulics to test engine more silent. Only one cylinder seems to knock. Will make new pin for this and get knock out.

①

Test of #2 model with Hydriores.

- ① Put <sup>model</sup> afloat & keel horizontal so as to suck out properly and sucked out.

Let out with 400 ft. of line. At low speed, about 4 miles per hour was noisy. I heard

① roar - ② crackles - ③ engine

noise of which

① = 30°

② = 40°

③ = 80°

This was too much noise. Stopped. Took in and sucked out again. Found that air bubbles come out of case for some time after immersion and these make

quite a loud sound.

After all bubbles had ceased, listened in. Boat stopped. Very quiet.

Rang bell soft away.

Very sensitive. Bell loud and overtones beautiful.

Proves that audions and resonant working fine and that noises were due to some other source.

While in water  
Resistance through coils with 850 ft  
#19 wire 94 ohms.

Resistance to ground 1,000,000<sup>ohms</sup> +.

With 130 volt Battery showed 3 volts  
stopped for lunch.

Then put out launch to test  
with bell.

Audions very noisy.

Tested with bridge & found only  
200,000 to 300,000<sup>ohms</sup> to ground.

Am afraid we broke down  
insulation when put 130 volts  
on it.

It is evident that the resistance of a receiver must be perfect. If any moisture gets in, electrolytic action starts and can be plainly heard. Produces noise and plenty of it.

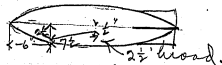
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Towed Sail Boat model at  
10 miles per hour.  
Pull 175 pounds.  
Throws wave clear and low  
tumbles & has immense wake  
Too much disturbance.

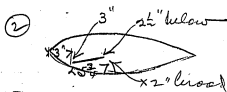
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(2)  
Towing small

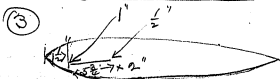
(1)



Original. These keel under  
for 8 ft.



Towed as deep and well as ①

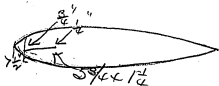


Dives deeper than ② but  
quieter.

④ Reduced weight inside  
to same as small  
transmitter fastened  
Same result as ③

⑤ Same as ③ but cut  
width of fins to  $1\frac{1}{2}$ ".  
Pull less than ③ & did  
not dive quite as deep.

⑥



Towed on hydraulics at 9 mi  
per hour.  
Dived - dived too deep.  
Pull 30\*

⑦

Cut fins to taper to  
shape of front,  
1 1/4"



Pull reduced to 25\*.  
Ras quieter!  
Apparently same depth

⑧ Made fins 4" long  
in place of 5 3/4. Otherwise  
same.  
Pull = 20#  
Fork given.

⑨ Put section 1 3/4 x 1 3/4 at  
same angle as bow fins  
little aft of amidships.  
Very steady. Good depth.  
Pull = 20#

⑩ Put amidships fins off  
and bent tail fins up. off  
Pull 40#. Unsteady

Moore left this afternoon.  
Said he was going to Orange and  
would be back Sunday night

10/7/17.

(3)

After getting receiver and joints apparently O.K. yesterday went out today to test out.

Put model overboard, held horizontal & poked water out and saw that all bubbles were out.

Put overboard and listened on audions. Very quiet but not quite sensitive as last test.

In 10 minutes became noisy. Measuring resistance shows

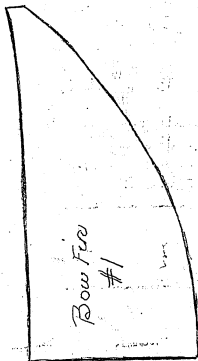
Resistance of coils 942  $\Omega$ .

Resistance to ground 270,000  $\Omega$ .

Will waste time working with this while out. Will make tuning tests with this model to get as low resistance and

as quiet as possible.





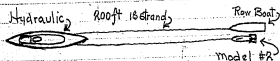
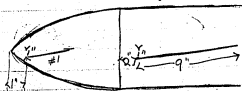
10/7/17

(4)

Towing Tests of Model #2.

Conditions: Towed <sup>model</sup> with 200ft 18 strand  
tared manilla rope.  
Towed observer in rowboat  
at same distance so as  
to be able to see the model.

- A. Left side fins on Model #2  
and put on bow fins shaped  
as shown on opposite page.  
Tails straight



Notes a It is evident that these models must be adjusted for stable equilibrium

B - Evident that when properly placed, small bow fins are much more effective than larger fins placed farther back.

C - These tail fins control the inclination of the whole model. It is evident that by setting them so that the whole model gives the pressure or strain on the front fins may be still further reduced.

D - Proves above

Result Model moved alternately come to surface and dive under about 3 ft.  
Unstable

B - Took off side fins leaving only bow & stern fins.

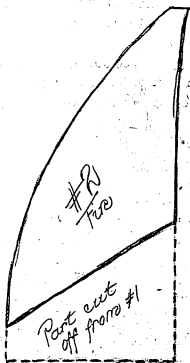
Result Towed steady about 5 ft under surface, but at inclination, forward up, of about  $10^\circ$ .

C - Then bent horizontal tail fins so as to deflect tail upward

Result Dived so deep that we could not see it. Probably more than 8 ft.

D - Changed inclination of front fins to  $1/2$  in place of  $1^\circ$ .

Result Still dove too deep so that could not see.



**E-** Then straightened out rear horizontal fin so as to give Tail only slight thrust upward.

Result - Rowed about 3 ft under surface almost if not entirely level. Very steady.

**F-** Changed nose fins to shape B - less surface. Nose now looks like this from above



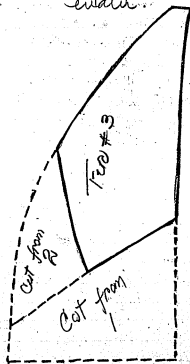
the front of this was 1" (measured on curved surface) from tip of nose.



Result - Unstable. Row from 3 ft under to surface but on even keel

Notes G Again proves C

H It is very important to have light at back and water apparently black (no light reflection) in trying to see under water.



G Horizontal rear fins changed so as to force stern upward.  
Result - Dived too deep, probably more than 8 ft.

H Changed front fins to #3. Also changed rear horizontal fin to smaller inclination.  
Result - Could not see model yet inclination of nose seemed to show that it was only 3 or 4 ft under.

We were now running so that sun was in my eyes as reflected from water when looking at model.

Changed direction of run so that sun was at back.

Real Result

Could now see model plainly running about 4 ft under surface on blue peel and towing very smoothly.

## Notes I.

After adjusting with a certain length of rope, it is evident that to change the length of rope ~~must~~ change the depth. This for two reasons—

- ① The angle of pull upward by the rope is less
- ② Weight of rope tends to depress nose.

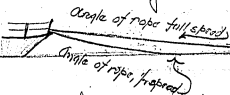
I - Then let out both row boat and model on 400 ft of rope.

Result. Model again dived too deep to be seen. Probably more than 8 ft.

---

---

Notes A Does not prove  
any thing. Apparently  
resistance does not  
follow law of square  
of distance. This is  
however not disproved  
by test.



At half speed the rope sags  
at full speed, straightens out  
so that less rope is exposed.

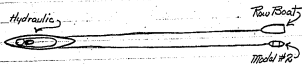
B. With this single front  
fin, tows fine.

10/8/17.

(5)

### Towing Tests with Model #2.

Attempted to complete work of yesterday.  
Did not have scale to take pull  
then. One we had rusted. Harley  
repaired yesterday afternoon. Got  
new one in bag! Darker to check  
by.



A. Let out 200 ft rope  
Half Speed (5 mi hr) pull - 30-35#  
Full Speed (9 " ) " - 50-60#

B. Let out 400 ft rope and went  
back in row boat to observe.  
Weather very rough so that  
this was difficult. Required  
two trials to succeed.

Model 2 towed about 5 ft

Notes

C-D-E

Seems to show that the pull of rope is directly as the length of rope exposed in water.

F Pull of Model 2 alone with small fin is probably 25# or less since some rope was in the water.

C #4 fin has area of less than 2 sq in, is brought forward so that front end is flush with nose and has inclination of  $\frac{1}{2}^\circ$ . That is rear is on horizontal middle line while front is  $\frac{1}{2}^\circ$  below this.

under surface and ran level,  
Pull at full speed, about 9 mi - 110#

C. Reduced front fin to shape #4\*  
With 300 ft rope, pull = (See Note)  
40# - 50# at full speed. (at end)

D. Let out 400 ft rope.  
Full speed pull = 125#

E Let out 800 ft rope.  
Full speed pull = 205# - 215#  
Stream pressure 150#  
Log = 1 mile in 6 min, 20 sec  
= 9.6 mi per hour.

F. To get pull of model alone let out on 50 ft rope.  
Pull, full speed = 20# - 30#  
Pressure 185#  
Log = 1 mi 5 min 50 sec  
= 10.4 miles per hour.  
(Higher speed because of lack of drag).

G. To get pull of line alone,  
let out 800 ft line nothing  
on end  
Pull = 210# - 220#  
Steam pressure 175# to 180#  
Log 1 mile = 5 min 55 sec  
= 10.2 mi per hr.

H. Same at slow speed  
Pull = 80# - 85#  
Log = 1 mile 11 min 30 sec  
= 5.2 mi per hour.

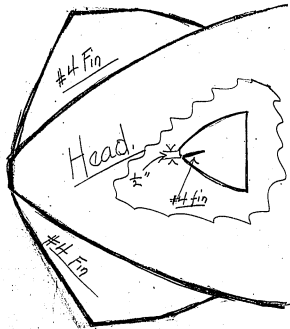
I. Let out 800 ft new steel  
and copper twisted pair  
wire.  
Pull at full speed = 55#  
Steam pressure = 150#  
Log = 1 mile 6 min 10 sec  
= 9.7 mi. per hour.

J. Same at half speed  
Pull = 15# - 20#  
Log = 1 mi in 15 min  
= 5 miles per hour.

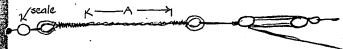
See next page



Shape of fin #4.



Strain Test of Steel and  
Copper twisted pair wire



Pull	Distance H	Stretch	Remarks
000#	19"	—	
100#	19"	—	
200#	19 1/8"	1/8"	
300#	19 1/4"	1/4"	
400#	19 1/2"	1/2"	
500#	19 3/4"	3/4"	
600#	19 7/8"	7/8"	
650#	—	—	Broke in section A.

Previous tests.  
Single wire broke

"	"	"	400#
"	"	"	350#
"	"	"	425#
Double	"	"	375#
"	"	"	450#
"	"	"	425#
"	"	"	400#

*Specifications of U.S.A. Field  
Wire manufactured by the  
Western Electric Co.*

Consists of 10 strands steel  
wire each .0115" diameter  
woven around a copper wire  
.030" diam., the whole being  
about .050" diam. This is  
covered with about .130" of  
very good tough rubber and  
then covered with braided cotton  
tapes the whole wire being  
about .165" diameter overall.

---

Test for Noise

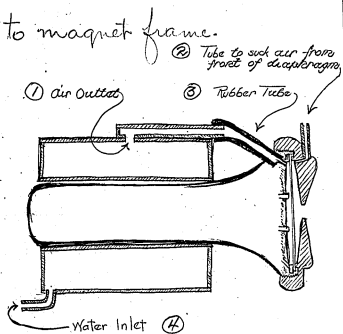
### Work on Receivers.

Both 1000<sup>0</sup> (002" wire) receivers, fell down on resistance to ground, measuring 800" in one case and 1400" in other. The Bell receiver we had been using also showed defective with only about 2500" to ground.

Barley then made up air tanks for equalizing pressure on diaphragm so that we could use regular Bell receivers for this work and experiment with insulating them. (Sketch on next page)

This proved much more difficult than anticipated. And we were not able to absolutely locate where the point of failure was though tests seemed to show from magnet windings or terminals

to magnet frame.



Air outlet ① is placed in center of cylinder so that water in cylinder will not enter space behind diaphragm should it need be tilted upward or downward.

⑥

Test of Bell Receiver in  
Model #2.

After taking off flexible leads, put rubber cupped pot head wire on Bell Receiver. Filled back and front (flush with magnet ends) with Pot. Chatterton compound.

Resistance in air showed more than 10,000,000 ohms.

Mounted this in #2 Model and punk near Hydraulic and connected to input of audions.

Output circuit quiet except for legitimate noises (waves, boots etc.)

Went out with Hydraulic to test.

Pit out on 400ft rope. Showed very noisy, pushing sound as of water passing. Some engine noise but crackling in addition.

Lift out on 800 ft rope. Noises  
about same - chime noise  
slightly less.

Measured resistance to ground.  
Found about 1200 ohms.

Cut off part lead wires &  
put aboard.

Resistance more than 1,000,000<sup>Ω</sup>.

Put reamur in bucket of  
sea water.

Resistance about 1300<sup>Ω</sup>.

Took out and dried out.  
Resistance about 250,000<sup>Ω</sup>.

Tested resistance of short  
lead in wires only. More  
than 1,000,000 ohms.

Pressing ground in reamur.

Filling Bell Receivers with various materials to preserve insulation to ground.

- ① Bell telephone used in previous test was taken out, Chatterton compound reheated and removed, and new Rot Chatterton compound run in place.

Test showed about 10,000,000 ohms. Put outside in water & connected to input of audions. Suit except for wave and natural noises. Left out an hour. Now noisy - crackles. Tested. Resistance to ground about 1000 ohms.

- ② Filled Bell receiver with mixture 50% Rosowax (probably not pure) 50% resin. Resistance in air more than 1,000,000 ohms.



Put in bucket of sea water.  
Resistance = more than 1,000,000  $\Omega$ .  
Left 30 minutes. Resistance  
= 2500 ohms.

- ③ Hardly found apparent trouble  
at contact with this.  
Repaired and refilled with  
fresh 50% resin, 50% bees wax  
mixture.  
Resistance = 1,000,000  $\Omega$  +.  
Left in bucket of sea water  
1 hour  
Resistance = 1,200  $\Omega$ .

- ④ Dried out. Resistance  
went back to about 1,000,000  $\Omega$ .  
Vaseline'd all surface around  
magnet heads, diaphragm  
and under surface of cap.  
Assembled and put in  
bucket of sea water 1 hour.  
Resistance = 20,000  $\Omega$ .

- ⑤ Dried out again. Resistance  
= 1,000,000  $\omega$  +.

Covered magnet tips with  
mixture 50% Rosin, 50% bees  
wax to depth of  $\frac{5}{1000}$  -  $\frac{10}{1000}$ .

Left in bucket sea water.  
Resistance = 50,000 ohms.

- ⑥ Made up another Bell  
Receiver, pouring inside  
full of melted gutta-percha,  
facing of outside by magnet  
tips with thin coating of  
Chatterton Compound as the  
Gutta Percha incased crumble  
on surface.

Resistance = 10,000,000  $\omega$  +  
" after 1 hr = 10,000,000  $\omega$  +  
" " 1 " = 10,000,000  $\omega$  +  
" " 2 " = 10,000,000  $\omega$  +  
" "  $2\frac{1}{2}$  " = 10,000,000  $\omega$  +

Looks good. Will try out.

⑦  
10/14/17.

Towing Test of new receiver.

Handley's new receiver, insulated with gutta-percha, stood overnight in bucket of salt water without breaking down.

Morning fair. Started out to Gardiners Bay to test.

① Let out 1000 ft twisted pair steel and copper wire and measured each 100 ft & left string for tag.

② 800 ft of wire out  
Pull at low speed about 4.5 mi per hr = 28#  
Pull at full speed 10 mi per hr = 90-100\*

③ Connected up to Audions. At full speed, low, low, musical note, which diminished but slightly at half speed.

Brought in to determine trouble.  
Found that the air compartment  
had leaked and was full of  
water and that we had made  
a wrong connection to the  
Audions.

Soldered up air compartment.  
Put pressure back and smoothed  
up every thing with putty  
shellack.

At full speed 10 mi per hour  
full now 70-80\*  
Shower roaring, crackling  
sounds.

On test insulation had fallen  
to 120,000 ohms.

Peek in and found break down  
in joint.

Weather now very rough.

10/16/17.

Tests for Noise.

Put new 1000<sup>00</sup> receiver, which with joints had been in sea water 12 hours, overboard and connected to input of audions. Showed noise. Test showed more than 1,000,000 ohms resistance.

Connected Bell Receiver with diaphragm off to input of audions. Showed noisy crackles.

Next checked B battery. Found one cell rusted at connectors. Other connectors loose and dirty. Wire connections loose and dirty. Wire of fourth stage to output unenclosed & loose. Soldered, tightened & cleaned up connections. Noise disappeared.

Again put receiver overhead  
connected to input. Showed  
quiet except for wave noise.  
Very sensitive with B<sup>+</sup> Bell.

Put this in small wood  
model. Did not balance well  
stood tail up about 30° in water.  
Went out with hydraulic.  
In towing, moved dive &  
dant vertically.

Brought in and changed  
rear horizontal fins.  
Dived to bottom and broke  
off copper front fins.

Brought in and took off  
front fins and balanced  
weights so she balanced  
in water.

Now towed very nicely at  
from 100 to 400 ft.

Connected to input of audions.

Noisy on low speed  
Worse at high speed.

This model has cracks in  
it and is not perfect. We'll  
make noise tests in Model  
more should have ready  
tomorrow.

---

Had Jim Burns tape first  
40,000 ft of USAF wire  
so that when model dunes  
to bottom, insulation will not  
be dragged off.

---

10/17/17.

Paint dry on Moore's Model 4.  
Brought edw to balance up.  
On floating in water found nose  
too heavy. Tried towing. Pulled  
too much.  
Took lead out of lower part of head.  
Balanced better.  
Moore took back to Head and Chutes  
to balance with his micro phone  
w.

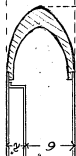
Worked on Model 3 (made in  
laboratory). Air tank leaked. Had  
to pull up and test several times  
to get OK. Will take out tank  
with integral with body and replace  
with separate tank which will have  
3 advantages -

- ① Less weight particularly on top  
where weight not wanted.
- ② Easier to make watertight because  
easier to get at.
- ③ Probably not be as subject to  
break because being separate from  
body not liable to be cracked by





2.9



16"

Cross Section, Container #3, Scale 1/8" = 1"

strains to body.

Mounted Rec receiver insulated with Gutta Percha in #3 model. shown on opposite page.

This was equipped with pair of 1/16" galvanized iron tails, full sized diagram on next page.

No front fins used in this test.

Receiver sound insulated with rubber sponges.

#### Preliminary-

Receiver mounted inside. Joints carefully made and piece of rubber tubing clipped out after made.

Receiver and joints then tested out after immersion in water. Showed more than 1,000,000 ohms.

L. 1 Rear Fins  
#3 Rodal

Section Under Water

⑧  
10/17/17.

Towing and Pose Tests, #3  
Model.

no front fins used.

- ① Rear fins left straight. 200 ft  
USA. Ried Mre let out  
Dived too deep. Pull too great.  
Model evidently towing nose  
down

- ② Turned rear horizontal fins  
up so as to throw nose of  
model up



With 200 ft wire out, pull  
less but model came to  
surface

- ③ Reduced upward tilt of rear horizontal fins somewhat.  
With 200 ft line, model still comes to surface.
- ④ Still further reduced upward tilt of rear fins.  
With 200 ft line rode well at half and full speeds.  
With 400 ft rode well at full but went to bottom at half speed.
- ⑤ Bent these fins back about as ③.  
Rode well.  
400 ft. wire out.  

Rode at half speed (5 mi)	=	30 ±
" " full " (10.)	=	60 ±

Then connected this to input of audions. Very noisy.  
Rushing noise like torpedos.

Then connected Bell receiver diaphragm off to input of audions. Audions quiet.

Then stopped hydraulic, pulled model in and listened. Model was now on surface. Noise of waves very prominent.

These tests as compared with previous on #2 seemed to show—:

- ① That the broader rear fins of Model #2 are better than the narrow fins of #3.
- ② That no holes are required for sounds to enter these models to reach the receivers. These sounds travel through the shut iron boxes under water.

Note:

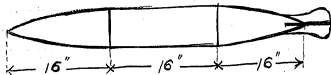
10/18/17

⑨

Change of Rose on #3 Model.

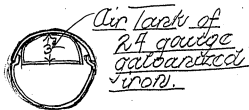
Believing that one trouble with #3 model yesterday was too blunt a nose, changed model #3 so as to give sharp nose.

This model now measures.



Using the same narrow  
red fins of yesterday.

Danley made new separate  
tank for this. This tank is  
made of #24 gauge galvanized  
metal and is 3" deep



Mounted out with hydrolics.

① - No bow fins. 200 ft  
USA. Field Mine.

At Half Speed (abt 4 mi per hr) 5#  
" Full " " 9.5" " " 30-35"

Pull satisfactory light but  
not as steady as desired.

Connected up to input of  
audions.

Noise much better than  
before, a combined roar with  
sound as of vibrating of  
gubbers - crackling. This  
however is great improvement  
over any thing previous,  
except the old wooden model  
with peel.

② Then let out 500ft  
wire  
Pull at half speed abt 4.5 mips. to 52"  
" " full " " 96. " " 50-60"

At half speed seems to ride evenly. At full speed, jumps somewhat as indicated by varying pull.

Connected to input of audions. At half speed fairly quiet. At full speed quite noisy - much more so than with 300ft.

Indicates that the model is not riding level & even.

Apparently model was diving too deep. Turned back fins to make dive less deep. Came to surface.

Again adjusted these rear fins. Model began jumping as indicated by intermittent



pull.

Stanley then put on pair of  
bow fins. Model still  
jumped.

Decided to change rear fins  
to broader ones like #2  
model so as to hold more  
fatigue. This will be done  
tomorrow and try out  
tomorrow.

9/19/17

(10)

Further towing tests with  
Model #3, using pivoted  
loose.



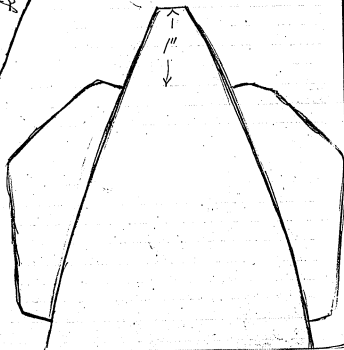
Based on experience of yesterday changed rear fins to shorter and longer ones, same design as used on Model 2.

While going out to Gardiners Bay on hydraulic, made some speed and propeller revolution tests as follows:-

A. Average R.P.M.  
Steam pressure  
1 mile in  
Miles per hour

127.  
175#  
3 min 40 sec  
6.9

Actual size of  
front fins used.



B. Average R.P.M.	160
" steam pressure	150#
1 mile in	7 min 27 sec
miles per hour	8.06
C. Average R.P.M.	188
" steam pressure	160#
1 mile in	6 min 10 sec
miles per hour	9.7

Tested Model 3 with sharp  
head and long tail fins

Weather Very Rough. High wind  
In Gardiners Bay, waves  
fully 2 1/2 to 3 ft. White Caps.

- ① 200ft U.S.A. Fuel Mfg. out.  
Fuel Speed (abt 95 mi per hour) 35#  
Pull -  
Connected to Input of Audions  
noisy. More than yesterday.  
Used front fins shown on  
opposite page.  
Front fins on center line of  
nose and straight.

② Then tilted front fins trifle  
so as to bring back up.  
With 200 ft wire pull = 30#  
Quite quieter than before but  
still noisier than yesterday. Can  
distinguish engine noise.

③ Let out to 400' wire 50#  
Pull =  
Not quite as much noise as

③. Can not hear engine as  
plainly. Still too much noise

④ To be sure of audions put  
pull required to connections  
to model.  
Audions tested O.K.

⑤ Removed front fins 30#  
200 ft wire pull =  
Quite quieter than before.

⑥ 400 ft wire pull = 50#  
Quieter. This is the quietest  
to day and compares favorably

with yesterday.

Note Listened in on this at slow speed (about 5 miles per hour) and then, speeded up to about 10 miles. Noise increased as soon as engines started, before speed of model increased showing that at least a part of the noise was from the propeller as it did not show periodic engine turns.

- ⑦ Turned rear fins to send nose of model up.  
400 ft wire, pull = 55#  
Model showed intermittent rise. Came to surface of troughs of waves.

- ⑧ Turned rear fins again to practically straight.  
400 ft wire, pull = 45#  
Better than before.  
Believe it is as good as yesterday.

- ⑨ Let out 800ft wire -  
Pull = 65 to 75# with waves.  
Listened in. At first loud crackles  
at intervals but between these,  
comparatively quiet.  
Had speed of boat reduced.  
Noise correspondingly  
diminishes.  
Again speeded up boat. Could  
plainly hear acceleration  
of engines. No crackles.  
Pull increased to 80#  
proving that model was  
going deeper.

This is encouraging as the  
day is very rough

Took model out of water.  
Found air chamber crushed  
in. This accounts for crackles  
(air bubbles getting out) and the  
increase in pull.

- ⑩ To see if the wire ~~it~~  
makes noise, short circuited  
ends & properly insulated and

elt out 200ft.  
Audions show quiet.

10/20/17.

Burns and Hardy left for  
Orange.

Made speed test on hydraulic

Steam pressure 170\*, Rpm = 72  
" 160, Rpm = 66.66, 66, 64, 62  
1 mile in 17 min 30 sec  
= 3.4 mi per hour.

Pressure 160-127, 134, 136, 137, 137  
1 mile = 8 min 15 sec  
= 7.25 mi per hour

Pressure 145\*, 147  
150\*, 148, 150  
155\*, 154.  
1 mile = 7 min 40 sec  
= 7.9 mi per hour.

Pressure 150\*, 179, 180, 180, 180  
1 mile = 6 min, 15 sec  
= 9.6 mi per hour



Pressure 150<sup>#</sup>-185, 186, 186  
1 mile = 6 minutes, 0 sec  
= 10 miles per hour

---

Pressure 190<sup>#</sup>-202  
210<sup>#</sup>-211  
210<sup>#</sup>-212  
1 mile 5 min 50 sec  
= 10.3 miles per hour.

---

Curve of this phase straight  
line to 180 P.M. Then  
falls off

---

To do next week -  
Make new air chamber.  
Use #3 make with 2000 ft  
wire & take out to  
torpedo range

Test out Marie's microphone  
in model

Change B. Batteries.

10/23/17.

Hanley and Burns not yet back.  
Moore back at work this morning.

Get cork from Eastern Ship. Co. Dick  
Frank took to small shop near R.R.  
station to work up to float for shaping  
to float for model #3.

Moore came over and assisted.

In afternoon took Moore's model out  
for test. He had balanced this  
carefully so that it was level  
in water, stood about 1" out with  
instrument in.

(11)

Towing Moore's model with  
U.S.A. Tugs Mire behind Hydraulic

A = 200' wire. Tows steady and  
well under surface.  
180 R.P.M. = 9.6 mi per hour  
Pull = 25#

B. = 400' - Tows Steady  
40#-50# pull (waves)  
@ 9.6 mi per hour. 180 P.M.

C. = 800' - Tows Steady  
80# pull.  
@ 9.6 mi per hour 179 P.M.

D. = 1500' - Tows Steady  
170# pull  
@ 9.6 mi per hour 180 P.M.

E. = 2000' - Tows Steady  
280# pull  
@ 9.8 mi per hour 185 P.M.

When pulled in found it had dragged bottom due to stopping as bottom of instrument was scratched and wire abraded, also had seaweed and kelp on nose.

Wire was twisted in direction of regular twist. ~~Twisted~~ <sup>twisted</sup> pair wire showing that the model had revolved. Believe this was due to kelp on nose. (117)

line air chamber nearly full  
of water, showing bulge out.  
Other collapsed in.

Allowing about 6\* per 100 ft  
pull of wire and 20\* pull  
of instrument, the calculated  
and actual readings were  
(deducting 100 ft in each case)  
for amount of wire in air

	actual	calculated
200 - 6+20	25	26
400 - 18+20	45	38
800 - 42+20	80	62
1500 - 84+20	170	104
2000 - 114+20	230	134

This rule does not work  
out exactly probably because  
at the longer stretches the  
weight of the wire carries the  
model further down and the  
angle of the wire to the  
water is increased.

Believe the collapse of air  
tanks occurred about the 800'

pull or when we stopped  
to let out 1500 ft.

10/25/17.

Burns back last night

Bad blow night of 23d and almost all day 24th. Rampant anchored in Harbor bed until about 10am 24th. Because of turning seaward to wind, pulled her anchor loose and went in to Eastern Basin whp. Bldg. Co dock striking corner of a barge.

He tied her up and though she pounded severely, her thick planking held.

Damage seems to be dent where she struck corner of barge and starting seams above water and paint knocked off. We got off lucky as the wind must have been close to 80 miles per hour.

---

Moose is making cork floats for his model. Hanley and Burns

charging 3 Batteries, putting and  
smoothing up wooden heads  
of #3 model, testing and cutting  
off wire damaged in towing.  
Moore's model, getting model  
3 balanced with new cork float,  
testing, insulating and mounting  
receiver in #3 model. Will  
try and get ready for test  
tomorrow.

---

Test of Meissner's  
Receiver.

This was put in buckets of  
sea water 19/8/17 and  
tested 7100,000 ohms.

On test yesterday 19/4/17 showed  
only about 200 ohms

The magnets of this were  
wound with 00s wire and  
given 1 coat of Sterling Varnish  
and baked. Then filed with  
Chatterton Compound.

(12)

10/25/17.

Test of Moore's Microphone  
in Model #4.

Weather - Calm, quiet except  
last 4 or 5 readings when  
it began to blow up a  
little.

Connected up Moore's  
Microphone to input of 1  
Stage audion.

① Hydraulic stopped. Put  
overboard and ducked out.  
Could hear waves sloshing  
it and rolling it.  
Rang bell to test sensalium.  
Could hear bell but not  
as loud as with Bell  
Receiver and 4 Stage  
audion.

② Put out on 200'. U.S.A. Fuel Mine,  
Stopped engine. Slight intermittent  
CND



400' - 10 mile basis = 43.5#  
1000' basis = 109#

noise. Tested with bell. Could hear faintly.

Half Speed 94 R.P.M.

Noisy - bubbles, crackles and roar of rushing water. Had a peculiar blup, blup, regular, periodic sound, 3.2 seconds apart.

Full Speed = 180 R.P.M.

Very noisy. Alternately came to surface and dived.

(3)

400 ft.

106 R.P.M. = 6 mi per hr.

Pull = 20# steady.

Noisy. Steady rushing sound.

180 R.P.M. = 9.6 mi per hr

pull = 40# steady.

Noise increased and changed but not until boat accelerated showing that this noise was due to speed of mobile through water and not to engine.

600 ft - 10 mile bars = 74#  
@ 1000' bars = 173#

(17)

600 ft.

72 R.P.M. = 3.9 mi per hr.

Same steady rushing noise  
as before

169 R.P.M. = 9 mi per hr

Pull = 60#

Increase of rushing noise  
after speed has increased.

(5)

800 ft.

124 R.P.M. = 6.7 mi per hr

Pull = 40#

All noise and sound  
gradually died out. Tested  
1 stage audio with Bell  
Receiver as transmitter on  
input. Is O.K. Trouble  
therefore with the  
microphone.

On taking out found small  
amount of water inside  
covering all surfaces  
including the carbon  
contacts. This seems to be  
from capillary seepage.

(18)

10/25/17.

Test of Model #3 with  
Cork float.

Made cork float for model #3 in place of air tanks which collapsed. This worked O.K. Held the model nearly an inch more out of water, showing greater buoyancy and did not collapse when sunk.

Receiver insulated with Gutta-Percha which had stood up for 8 or 9 days full down-resistance only 200,000 $\omega$ . Put in a receiver insulated with beeswax and rosin which had stood in pail of water for 4 days.

Preliminary Test.

Connected to input of audions, hydraulic stopped. Showed metallic noise of waves

400 ft - 10 mile bars = 58.9\*  
@1000' " = 147#

hitting iron body of model.  
With three showed good and  
sensitive.

Ran at low speed. Noise  
diminished from surface  
noise due to lack of banging  
by waves. Noise almost  
ceased. Very slight. But  
noisy as speed reduced  
to 0 and it came to  
surface.

Increased speed to  $\frac{1}{2}$   
noise diminished.

Increased speed to full.

Noise diminished to certain  
point then increased.

- ① 400 ft U.S.A. Field No.  
1 speed = 94 R.P.M. = 5 mi.  
Pull = 20# steady  
Increased engine speed. Noise  
increased before boat  
got up to speed  
140 R.P.M. = 9.2 mi per hr.  
Pull = 50# steady.  
Hear engines. Some rushing  
noise.

600ft - 10 mi basis = 72#  
 @ 1000' basis = 120#

Then stopped engine. Noise also stopped before speed of boat diminished much. Had engine started, noise came up before speed of boat changed.

② = 600ft  
 R.P.M. = 100  
 Pull = 25# steady.  
 Less noise than ①. Can hear engine plainly.  
 R.P.M. = 168 = 19.1 mi  
 Pull = 60# leaky.  
 Noise louder than full speed in ①. Seems to show that the balance of instrument at 400' is best.

③ 800' ft.  
 R.P.M. = 1112 = 6 mi per hr.  
 Showed intermittent noise and scale jumped proving striking on bottom or other intermittent resistance.

Pulled motor in to examine.

400 ft Cork floats - 10 mi hours 50#  
@ 1000' hours = 125#

- ④ Turned rear horizontal fins up slightly so as to keep nearer surface.

~~200 ft~~ = Stop quiet.

R.P.M. = 124 = 6.6 mi per hr.  
noise increased slightly  
Hear engine.

RPM = 180 = 9.8 mi per hr.  
Intermittent noise. Comes  
to surface & dives.

- ⑤ ~~400 ft~~. Cork floats on wire  
at 200' & 300'

68 R.P.M. = 3.6 mi per hr.  
Pull = 12.5#

Very quiet. Hear only engine  
noise and that plain

168 R.P.M. = 9.0 mi per hr  
48½# steady pull.

This is good. Corks have  
diminished rather than  
increased pull.

400ft - 10 mi bars = 51.6 #  
@ 1000' bars = 129 #

600ft - 10 mi bars = 85.2 #  
@ 1000' bars = 142 #

- ⑥ Then increased corbs so as to have at 200'-250'-300'-350'

400ft

106 R.P.M. = 5.5 mi per hr.

20 # = steady pull.

Steady noise. Hear engine.

180 R.P.M. = 9.6 mi per hr.

45-50 # = pull, not steady.

Showed intermittent noise.

Came to surface & dives.

Good shows we can control depth at greater distances

- ⑦ - 600ft. Additional corbs every 50'  
173 R.P.M. = 9.4 mi per hr.  
75 # = steady pull.  
noise increased. Rattles.

- ⑧ Back to 400' to determine trouble  
at half speed very noisy  
showing something had  
happened.  
Pulled in. Motor had  
nose full of seaweed  
and kelp.

400ft - 10 mi bars = 52.3 #  
@ 1000' bars = 131 #

600ft - 10 mi bars = 83.3 #  
@ 1000' " = 139 #

800ft - 10 mi bars = 100 #  
@ 1000 ft bars = 175 #

⑨ Cleaned off.

400' with corks each 50'  
128 R.P.M. = 6.6 mi per hr  
30# pull, steady.

Very nice & quiet. Hear  
engine plainly.  
172 R.P.M. = 9.3 mi per hr.  
45# = pull steady

Noisy. Came to surface. Good

⑩ 600 ft. corks each 50 ft.  
98 R.P.M. = 5.3 mi per hour  
27.5# = pull steady.  
Quiet  
178 R.P.M. = 9.5 mi per hr  
75# = pull steady  
Quiet

⑪ 800 ft. No more corks.  
104 R.P.M. = 5.6 mi per hr  
40# = steady pull.  
170 R.P.M. = 9.2 mi per hr.  
85# = steady pull.

At 104 R.P.M. almost all engine  
noise. At full speed still hear  
engine belt & other sounds  
also. Had engine stopped



1000ft - 10 mi baro = 117#  
@ 1000' = 117#

600ft - 10 mi baro = 87.2#  
@ 1000' " = 145#

While noise was up, still some noise

- ② - 1000 ft. No more cobs.  
130 R.P.M. = 7 mi per hr.  
60# = pull  
Increased noise. Crackles,  
182 R.P.M. = 9.7 mi. per hr.  
110# = pull.

At first noisy & pull varied  
between 100#-180#. Then quieted  
down and pull showed 110#  
steady.  
Still extraneous noise at more  
than 600ft.

- ③ - 600 ft - same as ②  
118 R.P.M. = 6.4 mi per hr  
32½# pull = steady  
172 R.P.M. = 9.3 mi per hr.  
75# pull = steady  
Noises both at half and  
full speed than ②. Something  
wrong.

Test showed Resistance to ground  
= 145,000 ohms. This proved to

be in joint.

10/27/17

Galvanometer for bridge gone bad  
so can not test resistance.

Put corks in tops of nose & tail  
of Model 300 as to increase  
buoyancy.

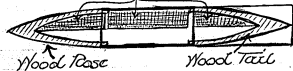
Put in resistor (wax & resin insulation)  
and connected up.

Shows very quiet on aubions  
but can hear bell plainly &  
with all overtones.

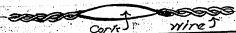
(14)

Test of Model #3 with corks  
is for extra buoyancy.

Corks for buoyancy



Detail-fasening cork  
floats on U.S.A. wire.



C1453

- ① 600 ft. wire. Corks at 100, 200, 300, 400, 500.

At half speed, noisy. Rushing crackling, bubbling noise.

Stopped engine. Noise continued with speed of boat.

Full speed

174 R.P.M. = 9.4 mi. per hr.

60# pull = steady

Still very noisy.

- ② Then took all corks off to get conditions of yesterday.

124 R.P.M. = 6.7 mi per hr.

Still noisy. Can hear engine but there are additional noises.

166 R.P.M. = 8.9 mi per hr.

Still noisy. Noise changes and increases with speed.

- ③ Put corks back again as ①  
98 R.P.M. = 5.3 mi per hr. 45#  
While speed was increasing from 0 to 5.3 mi per hr., there was a time, lasting a

few seconds when extraneous noise died away entirely and the engine sound was the most prominent.

172 R.P.M. = 9.3 mi per hour

105# fuel first = steady

120# " " = "

As above, at an intermediate speed between half and full, there was a point lasting a few seconds where there was very little extraneous noise.

This no noise point appears to occur only during a change in speed and not at any fixed rate of speed. It seems to occur then when in the process of getting a stable position for towing. The model has gotten into some position where there is least friction or resistance or swirl or upthrust, it is that produces this noise.

④ - 1500 ft wire - 14 cork floats.  
At low, uniform speed, about  
2 mi per hour, very noisy sub.  
123 P.M. = 6.9 mi per hour.  
95# pull = Steady.

Noisy  
While accelerating to full speed,  
model came to surface & was  
noisy.

180 P.M. = 9.6 mi per hour  
155# pull = Steady.  
Noisy.

Then dropped back to  
intermediate speed to see if  
different -

150 P.M. = 8.4 mi per hr  
125# pull = Steady

Still noisy

Pulled model in. Found long  
piece of kelp on nose.  
This would destroy towing  
equilibrium and make  
noisy.

- ⑤ Let model out 400ft  
and observed at various  
speeds from towed boat.  
124 RPM = 6.7 mi per hr.  
30# = even  
174 RPM = 9.3 mi per hr.  
50# = even

At lower speed towed bow  
up but at lower speed would  
ride perfectly level. This  
seems to confirm listening  
in experiments where it  
sounded best at an  
intermediate speed. The  
model probably was running  
on even keel and with least  
eddy currents at this speed.

Then bent the rear horizontal  
fins to perfectly level and  
again observed. Same  
results. Dumps at changing  
speed for a few seconds.  
Noisy at fixed speeds.

These experiments seem to  
indicate that extra work

produces an class buoyancy  
and that ~~the~~ the extra pull  
necessary to keep model up  
water produces surbs which  
make the noise.

~~146 P.M. = 7.7 mi per hr  
50# pull - steady  
noise  
170 P.M. = 9.2 mi per hr  
50# pull - steady  
noise~~

- ⑥ Extra corbs removed from  
nose and stern.  
400ft wire. Cork floats  
every 50 ft  
146 P.M. = 7.9 mi per hour  
40# pull = noise  
170 P.M. = 9.2 mi per hr.  
50# pull = noise.

- ⑦ Then changed cork floats to  
every 25ft apart  
172 P.M. = 9.3 mi per hr.  
50# pull = steady.

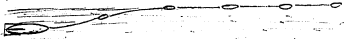


at half speed rhythmic clicking  
in with other noise. At full  
speed, same rhythmic clicking  
but more rapid. Extra cork  
floats evidently making  
broad, wide steamer surface  
and these clicks are  
ripples.

- ⑨ Then took off the 25 ft  
floats leaving only at  
50' intervals  
116 P.M. = 6.3 mi per hr.  
30# pull = steady  
noisy  
167 P.M. = 9.4 mi per hr  
50# pull = steady  
still noisy.

- ⑩ Again put back 25' interval  
floats to try effect  
118 P.M. = 5.9 mi per hr.  
25# pull = steady  
165 P.M. = 8.9 mi per hr.  
50# pull = steady.  
Both noisy.

Hanley went back in  
row boat and found  
following floating.



He then made several trials  
and balanced model.

Noise much reduced  
pretty good.

While at this adjustment  
determined to feed it and  
try out with torpedoes Monday.

1.3  
5.2

#  
Photostat for test  
better circuit.  
Try 3 stage audion  
Long Martin

10/29/17.

Tests with Model #3.

Connected up #3 model with  
Resonance & Reson. insulated receiver. Tested  
out. Is very quiet.

Resistance test to ground shows  
only 200,000 ohms. This is bad but  
testing conditions are too good  
to miss.

Put out bee in row boat. While  
under way at about 5 miles per  
hour could hear bee plainly  
at 200 - 300 yards.

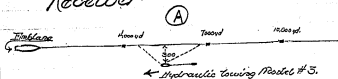
Went to Gardiner's Bay and  
ran parallel with torpedo  
course to get torpedoes.

At 1:36 P.M. audion quit.  
Found however that current  
through the filaments was low  
and that this made the circuit  
unusually quiet. Put on  
new battery and brought

filament current to 1.3 amp.  
 at 136 R.P.M. = 6.4 mi per hour  
 somewhat noisy. at 106 R.P.M.  
 = 5.6 mi per hour, somewhat  
 quieter. Cut down current in  
 1-2-3 stage audions. Became  
 then fairly quiet.

more put his instrument  
 overboard also.

(15)  
Test of #3 Model with  
Nat and Posie insulated  
Receiver



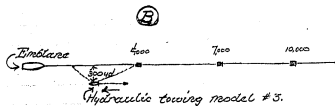
400 ft of wire out. Cords at  
 25' 50' 100' 150' 200' 250' 300' 350'  
 Speed = 110 R.P.M. = 5.8 mi. per hr.  
 First heard torpedo at 500-600 yds.  
 Loud " 800 yards.  
 Heard to 700-800 yds.

Based on these, telegraphed  
as follows:

T.A. Edison, Civil Board Bn, Navy  
Washington, D.C.

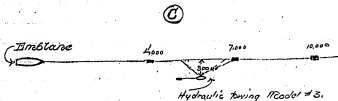
First test on range heard torpedoes  
plainly five hundred yards three  
trials while under way six miles  
per hour towing Beal model at  
few hundred feet. Heard with  
microphone model also. Sea  
Rough

Am Kennedy.



Same length wire and corks  
as (A).

Speed = 112 R.P.M. = 6 mi per hour  
First heard torpedo at 500-600 yds.  
Heard to at 800 " " " " " "



Wire and corks same as (A)

Speed = 130 R.P.M. = 7 mi per hr.  
First heard torpedo at 600-700 yds.  
Heard to at 800 " " " " " "

Very Encouraging.

Weather, Tangle, Course Make Cops.  
So rough that Emblance came in.

①⑥

Variations of Noise with Speed.

① 200' - Cuts 25-50 and each 50  
96 R.P.M. = 5.2 mi per hr.  
Junt at first. Became noisy

② 400' - corks each additional 50'  
98 R.P.M. = 5.3 mi per hr.  
Less noise than above

③ 600' - corks at each additional 50'  
102 R.P.M. = 5.5 mi per hr.  
Less noise than above. Engine plain

④ 800' - small corks each additional 50'  
106 R.P.M. = 5.4 mi per hr.  
Very noisy. Must be slicking bottom

⑤ 800' - as above  
142 R.P.M. = 7.7 mi per hr.  
Much quieter than above. Can hear engine.

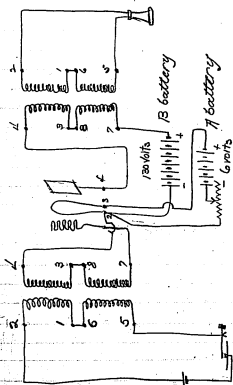
F-800' - small corks each 25' after 600  
82 R.P.M. = 4.5 mi per hr.  
Junt. Good

⑥ As above 130 R.P.M. - Noisy

⑦ As above 174 R.P.M. Increased noise

⑧ 200' - corks at 25'-50' each 50' knaffer.  
178 R.P.M. Junt noisy.

# Corrections for Microphone and One Stage Audions.



See  
Microphone

10/20/17.

Blow yesterday afternoon increased and developed into storm and rain which lasted all day.

Shaffner came last night. Spent day with him going over apparatus, and situation concerning the Rampant.

Hanley tested out joints. Found resistance about 200,000 ohms. Made new joints.

Also made drawing for 6" cross-section towing model.

Burns made another air tank for Bur. Receiver so that we could have spare one already set up.

Shaffner left 2:50 for Orange to get list of new material wanted.



10/31/17

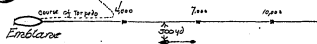
Further Tests of #3 Model with  
torpedoes.

Weather: <sup>(15)</sup> First torpedo (3)  
Calm. Others came round &  
white caps. Waves about 12".

Missed first torpedo. Too noisy  
and too sensitive. Stanley  
thought he could just detect.  
This was taken at full speed.  
180 R.P.M. and with all audion  
tubes with full current 1.3 amp  
through filaments.

Reduced filament current of  
the first 3 stages and speed  
to 112 R.P.M. = 6 mi. per hr.

①



Torpedo fired. Ran straight almost to 4000 yd point then turned and went back toward Embarked.  
Moore states that he heard this. Impossible.

②

While waiting for next torpedo to be fired tried resonating speaker on audions in place of head receivers. Found that at 98 it made the noises louder - being a resonant point probably for the audion circuit.

③

Weather Cables:



600 ft U.S.A. field wire with  
order at 25-50-100 & every 50 ft  
hereafter.

Speed = 130 R.P.M. = 7 mi per hr  
Hanley listening  
First heard torpedos at 2000 yds.  
Foudest 500 "  
I heard to 3000 "  
This seems too good to be true.  
Hanley reiterated that he was  
sure of his results.  
More heard this -

Audions then became more  
noisy. Pulled model in and  
could find nothing wrong  
except seaweed on corks.  
Rat in water again. At first  
quiet but soon again became  
noisy. Experimented with  
current through filament of  
audions and found that this  
noise varied as the current  
through the filament of  
the 3rd Audion. This is the  
one having the grid charging  
battery removed. Varied  
currents of this until circuit  
was sensitive but not  
noisy. Also reduced potential

of B battery from 144 to 130  
Volts.

Tried again speeding up to  
180 R.P.M. = 9.6 mi. per hr.  
model becomes noisy around  
this speed and unfortunately  
the noise is a screaming  
whistle very similar to the  
sound of a torpedo. This  
shows that our model  
must be further refined  
for high speed.

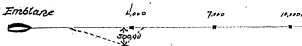
- ④ Weather little rough. Some  
white caps. About 12"  
waves.



Was same as ③  
Stanley listened. I confirmed.  
Speed = 120 R.P.M. = 6.4 mi. per hr.  
First heard torpedo at 2000 yds.  
Loudest 600 "  
Heard to about 1500 "  
Moore heard this also. I confirmed.

⑤

Envelope



Hydrolic Towing Model #3.

Same wire and corks as #3

Hainley listened I confirmed.

First heard torpedo 2000 yds.

Lowest 600 "

Heard to 1500 "

Weather somewhat rough. White

caps. Waves about 12" high.

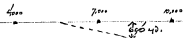
Speed = 140 R.P.M. = 7.5 mi per hr.

Moore heard this

Model shows intermittently noisy. Am unable to determine exactly why but imagine it collects floating grass and seaweed which disturbs balance and makes it run irregularly.

⑥

Emblane



Hydraulic Towing (Model) 3.

800 ft wire out. Cords 25-50-100 and each 50 ft to 600.

Speed = 72 R.P.M. = 3.8 mi. per hr.

We did not know torpedo was coming when Stanley announced that he heard it.

About 1/2 minute after it passed the 7000 yard mark which was 2500 yds from us.

showing that he had heard it about 3000 yards.

Continued to hear until about 2000 yds passed us.

Emblane then went in.

⑦ Speed = 140 R.P.M. = 7.5 mi per hr.  
Noise low. Could distinguish torpedo

800 ft wire out

⑧ Same wire.  
Speed = 176 R.P.M. = 9.4 mi. per hr.  
Noise more. Torpedo like.

and

Could not distinguish  
torpedo at this speed.

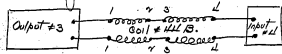
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It is evident that we will  
have to improve towing model  
to eliminate noise at  
higher speeds.

---

11/1/17.  
Tests of Model #3 for  
Poise with torpedoes.

Left Greenport about 7:45 am.  
 On way out tried putting inductance  
 in audion circuit between 3d  
 and 4th stages in attempt to  
 lower the electrical frequency of  
 the audion circuit so that its  
 note in the receivers would  
 not be like the high pitched  
 note of a Bliss torpedo.



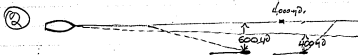
This coil had no effect on  
 pitch of audion noise.

Adjusted current through  
 filaments of 1st, 2nd & 3rd stage  
 audion tubes so as to reduce  
 noise, paying especial attention  
 to the 3d stage which seems  
 the most sensitive.





400 ft. wire out. Corks 25'-50'  
 100 ft. each 50' thereafter.  
 112 R.P.M. = 6.0 mi. per. hr.  
 Stanley heard torpedo first 1000 yd.  
 Fardest = 700 yd.  
 Heard to 2000 yd.

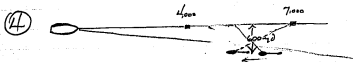


600 ft. wire out. Corks 25'-50'  
 & each 50' thereafter.  
 Speed = 102 R.P.M. = 5.5 mi. per. hr.  
 First heard = 2000 yds  
 Fardest = 1000 "  
 Lost at 1000 "

Task model in and greased  
 with vaseline to see if would  
 decrease resistance and  
 eddy-currents and noise.  
 Seems to have no effect.

- ③ While engaged in fitting out model after this, torpedo was fired which ran off course and came in about 50 yards of us.

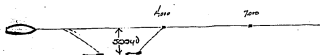
Speed = 74 P.P.M. = 4 mi. per hr.  
Stanley and I each having pair of head telephones heard very loud when near and for 3000 yards after it passed us.



Same wire and cords as ②  
Speed = 130 P.P.M. = 7 mi. per hr.  
Stanley and I both listened in  
Torpedo ran off course and  
came in 100 yards of us.  
First heard at 1000 yd  
Faint 100 "  
Could hear 2000 "

Audions somewhat noisy.

⑤



Same wire and corks as ②  
 Speed = 156 R.P.M. = 8.5 mi per hr.  
 First heard = about 1000 yds.  
 Loudest = 500'  
 Heard to = 1000'

This torpedo was not loud or clear like the others. Very difficult to distinguish. This is not new however as we sometimes had similar results while testing before. Also the higher speed increased noise.

Have not heard to day as well as yesterday. Will try and adjust 3d stage audion as sensitive as possible to stand the noise.

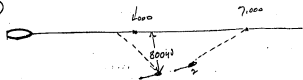
This shows that this method of mounting the Bell Receiver, as transmitter is method of insulating ~~and~~ is better than formerly and that the Audions are O.K. and very sensitive.

Steamer Montauk passed 3000 yds off. Heard her engines - Ditchuk - Ditchuk Ditchuk, 95 P.M. Very loud.

This sound however is quite different from noise of torpedos and would not confuse.

Emblau passed going in at 7000 yards. Could not hear easily as well as Montauk at 3000 yds.

(6)



Wire and corks same as (2)  
Speed = 13.4 R.P.M. = 7.2 m.p.h.  
First heard = about 500 yds.  
Loudest (very) " 800 "  
Heard to " 1500 "

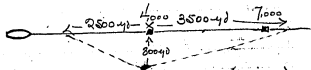
Listened in also with resonator rears. Thought I could get a response at about 6" but not sure.

This torpedo came to surface with a splash just before 800 yds and ran some distance with nose out of water.

Was much louder and plainer than #5.

Took model in and removed cork at 25' to make ride a little deeper.

⑨



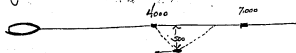
Had Hydraulics stopped and float taken out of model so as to sink it. Model sunk about 12' over stern. First heard torpedo in 15 minutes after left Embankment at 2500 yds from 4000 yds point. Heard about 2625 yds from Hydraulics. Heard for at least 500 yds past 7000 yard screw or for nearly 4000 yds from Hydraulics.

This is much better than one used to hear with old Horn & tripod model although there is more noise from banging against boat.

The sound is clearer & cleaner & better.

Torpedo came by unexpectedly. Neither Stanley or ear phones nor self on resonating receivers detected it. Tried to get resonance but could not get anything definite.

⑦

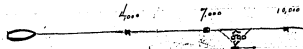


Wire and cork same as ② except cork at 25' removed.  
Speed = 180 R.P.M. = 9.6 m.p.h.  
First heard torpedo = about 600 yds.  
Faintest = 500 "  
Heard to = 1000 "  
I listened in on resonating receivers. Could not time or get anything definite with them.

At this speed there are three separate classes of noise

- ① A low frequency, non-periodic Br-br-br-br-br non-musical noise which I believe to be due to eddy currents, either

→ ⑧



Wire and cork same as 7.  
 Speed = 180 R.P.M = 9.6 miles per hr.  
 I first heard torpedo about 600 yd  
 Heard torpedo to 1000 "

It is evident that reducing the sensitiveness of audison to reduce noise is wrong as it cuts down all sound, legitimate as well as noise and that we need as much of the torpedo sound as we can get.

Then adjusted all audison units filament currents to 1.3 amp so as to bring up to maximum sensitiveness.

at the tail or at the intersection of the head piece with the body.



- ② A musical note resonating to about 9" air column. Believe this to be the electrical frequency of the audison circuit which resonates with ① Later results show also propeller noise of hydrocable.
- ③ The higher pitched screeching whistle of the torpedo.

Then reduced sensitiveness of audisons to get rid of noise by this means.

→ fellow opp. pages

For 11/2/17.

① Compare 4 stage and 1 stage audions

② Shunted receiver & bell test  
shunted receiver nearest to  
source of sound

③ Try 2 stage audion experiment  
against 4 stage

Get to P. G. Smith

- 1- container for 7000 R f32-1 ac
- 2- " " " "
- 3- Summit Sq. 1000, f60 = 1 ac
- 4- Container inside in road
- 5- West model f16-1/2 ac
- 6- " " " "
- 7- Same front new f32-1 ac
- 8- model #2 f32-1 ac
- 9- " " new f32-1 ac
- 10- Microphone in kit f16-1 ac
- 11- Seal Post Model f16-1 ac
- 12- Model, same f16-1 ac

**Notebook Series -- Notebooks by Experimenters Other Than Edison  
Navy and Wartime Research Experiments  
J. A. Hanley Books, Nos. 1-2**

These two notebooks were used by John A. Hanley during May 1918-September 1919. They contain notes on experiments with submarine detection, as well as listening devices to detect submarine torpedoes. Hanley reported to Edison on these experiments.

<u>Book #</u>	<u>N-Number</u>	<u>Labels and Inscriptions on Front Cover</u>
---------------	-----------------	---

**Selected Books**

1	18-05-12	"Experiments. Edison Submarine Detector. No - 1. From, May 12-18, To, Feb 14-19 J. Hanley"
2	19-02-15.2	"Experiments. Edison Submarine Detector. No - 2. From, Feb. 14 -19 To "



**Notebook Series -- Notebooks by Experimenters Other Than Edison  
Navy and Wartime Research Experiments -- J. A. Hanley Books  
Notebook, N-18-05-12**

This notebook was used by John A. Hanley during May 1918-February 1919 for experimental notes on submarine detection. The entries deal primarily with the deployment, placement, rigging, and sensitivity of the detector. Also included are tests of listening devices for submarine torpedoes and experiments involving the "quick turning of ships." Some of the experiments were conducted aboard the USS *Sachem* and the harbor steamer *Clio*. The notes indicate that Hanley was reporting directly to Edison and that William A. Hayes was conducting related experiments during the same time. The front cover is labeled "Experiments. Edison Submarine Detector. No - 1. From, May 12-18, To, Feb 14-19 J. Hanley." The pages are unnumbered. Approximately 135 pages have been used.

J.A. Hanley.  
Edison Lab.  
West Orange  
N.J.

75428  
Acme Co.,

MFG. STATIONERS,  
96 JOHN ST.  
AND  
19 PLATT ST.  
NEW YORK.

May 12. 1918.

After doing some preliminary experiments at Lab. I decided to hire a launch so we could make some accurate determinations before going on larger boat (Sackem)

May 13. 1918. 1

Description of motor launch Margie.

26 ft. cabin boat.

draught 2' 4"

beam 6'

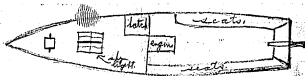
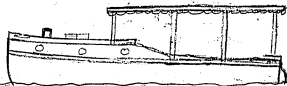
2 cylinder 12 H.P.

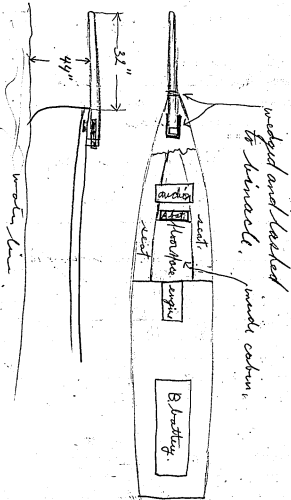
Lathrop engine located amidships.

speed about 9 miles per hour. (statute miles)

cabin extends from bow to amidships

canopy over stern from amidships.





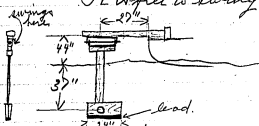
May 14, 1918. 2

Set up 3 stage audiometer on motor launch and constructed bowsprit as shown in sketch on opposite page.

Audiometer was very quiet.

Rigged apparatus containing transmitter from bowsprit as shown.

It is free to swing to port

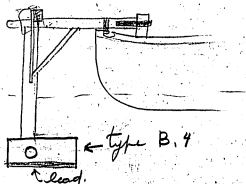


or starboard.

Found that I wanted to raise to the surface due to the action of the tide which was flowing at the rate of  $\frac{1}{2}$  knot per hour.

Added more lead to bottom. (about 7 lbs.)

Results the same.



May 15, 1918. 3

Run launch at slow speed  
model raised to the surface of  
the water.

When stopped it would  
come back to the vertical  
position.

Found that by holding  
in a vertical position with  
a stick on back side there  
was very little tendency to  
raise, but if it got a few  
degrees start it was very  
difficult to hold it.

Constructed braces to  
hold model in a fixed position  
as shown on opposite page.

While laying at dock  
tested instrument to.

Res of transmitter 72"  
" " ground 10000000"  
and on very quiet  
apparatus also very quiet  
heard tug over one mile  
down the river.

Run launch out at

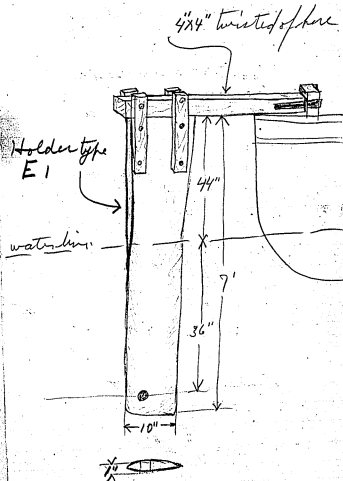
4  
a speed of between 4 and 5  
miles per hour.

Model wanted to raise  
to surface  
almost twisted brought  
of binoculars.

listened in while it  
was riding at an angle of about  
45°. was very quiet, same  
as when remaining still

Did not increase  
speed for fear of breaking  
apparatus

Found that the  
ignition system has an inductive  
effect on induction  
There is a click in  
receiver when plugs spark



May 17, 1941

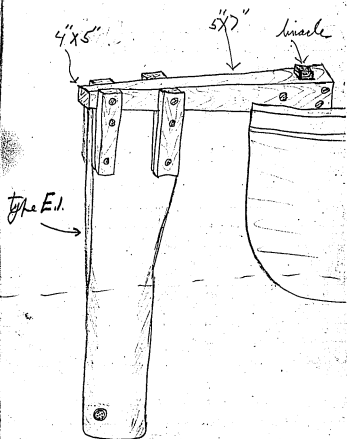
Constructed and rigged up  
new apparatus as shown.

Tested audion found OK  
Tested - res.  
void 73" ground 10000000"

Tested apparatus through  
audion while remaining still.  
very quiet. Hoyer and Burns  
confirmed

Run out with launch  
at slow speed. when making  
a short turn 4x4" bowprit  
twisted of at point indicated  
by arrow.





May 18, 1918.

Made new bowsprit  
and rigged spar shown.

Quite windy and water  
very rough.

Run out launch and  
apparatus towed B.K.  
Boat pitched and rolled  
considerable without any  
undue strain on rigging.

Listened in, seemed  
very quiet, outside of the  
inductive interference  
which is much more pronounced  
when engine is running  
on batteries than on a g.e.t.o.

It is impossible to  
eliminate this interference  
entirely due to the location  
of engine and the size  
of boat, which necessitates  
a distance of inductive range  
between an dion and engine.

This holder makes a  
decided difference in the  
steering of the boat.

Boat turns very hard.

May. 28. 1918.

Tested transmitter prepar-  
tory to making running test.  
Found that iron diaphragm  
touched magnets.

Put in new transmitter  
and tested res.

Coil res. 71"

Ground " 10000000"

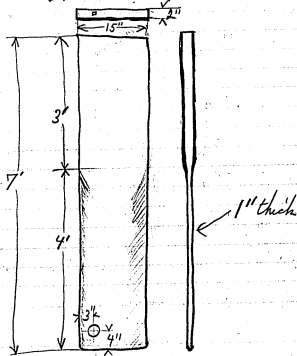
Audion very quiet and  
sensitive.

Listened in with apparatus  
and heard water bubbling  
noise. The water was some-  
what rough.

Could hear tug boats  
very plain over 1 mile while  
remaining still.

Could hear bell with  
overtone very clear for  
1/2 mile while remaining still.

Constructed new holder,  
Type F No. 1.



Transmitter inserted in hole  
with rubber 1/4 inch surrounding area.

Test No. 1. Holder E, 5/22/18

Auction very quiet and  
sensitive.

Tested res. of transmitter  
wires. 6 1/2"  
ground broken down.

Disassembled holder and  
examined transmitter.  
Found water in transmitter

After repairing and  
rigging up again tested res.  
wires. 7 1/2"  
ground. 10000 ohms

Apparatus very quiet  
when boat is remaining still.

Started engine, did not  
interfere except a slight click  
due to the induction (Cognifer)  
Got very noisy as soon  
as boat started.

Very bad water noises  
accompanied with boat noises  
It would be impossible

to hear anything above the noise  
(Boat was run at full speed)

Run launched at top speed and  
shut engine off.  
Noise diminished quite  
a lot, but there was water noise  
left, which died down as the  
boat lost momentum.

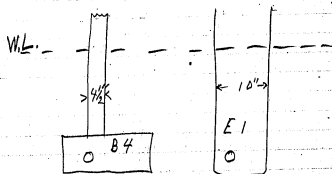
Apparatus seems very  
quiet when engine is running  
free, showing that there is  
very little noise transmitted  
to instrument through boat.

Gets very noisy as  
boat gets under way,  
poor stream line form  
of holder E1 may account for  
this.

The noises described  
above were not experienced  
May 15, when using holder B4.

This may also be due to the  
difference in amount of surface at

the water line, as shown  
here.



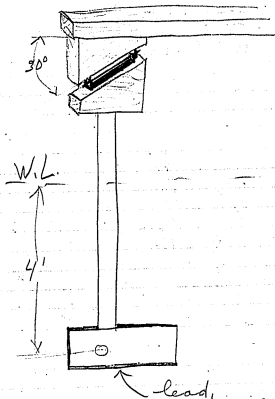
Test No. 2.  
Holder F1.

5/23/18

After rigging up F1  
and testing rev, found the  
ground. its broken down and  
the coil res about 9"  
Due to a defect in the  
insulation.

Made run test to learn  
riding conditions, rides OK,  
but makes steering harder  
than with E1

Could not hear any thing  
due to the short circuit.



Test No. 3,  
Offshoot B.4.

5/22/18

B4 holder suspended  
at an angle of  $30^\circ$  as shown  
on opposite page.

Seemed to ride well  
going slow, but as speed  
was increased to 607 miles  
per hour would raise to  
the surface.

There was no transmittance  
in B4, while used in this test.

The test being merely  
to determine the portability  
of utilizing this principle.

The angle of suspension  
may not be great enough.

5/23/18.

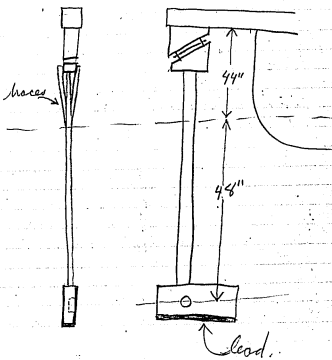
Found trouble in E.I. holder to be due to one of the wires being severed in the insulation.

Repaired and rigged up again and made run test.

Launch engine would not run on magneto and there is a great inductive interference when running on battery due to the ignition coil.

Water noises not so great as when using E.I. holder.

Looked over magneto and found spring broken



B<sub>4</sub> holder.

Test No. 1.

5/24/18

Repaired magneto on launch engine.

Made test with F1 (15) holder.

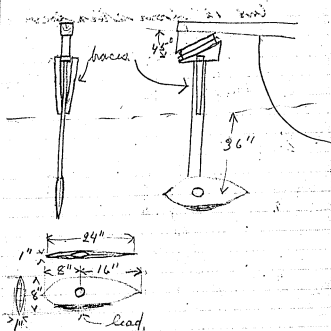
Water noises present but not as much as with E1 (10)

Test No. 2.

Rigged up B<sub>4</sub> at an angle of 45° as shown in sketch.  $\frac{1}{4}$ " thickness of rubber around transmitter.

It would ride O.K. and remain vertical while going very slow. But when speed increased to 4 or 5 miles per hour it would dart to the surface and go back to the vertical and vica versa due to the flexibility of the stick and the depth of it in the water.





dimension of type G. No. 1. model

Cut 12" from stick leaving  
36" in water

Results the same, noise,  
Went from side to side  
twisted of bowsprit.

Test No. 2.

Rigged up fish model  
model designated as type  
G. No. 1 (as known in sketch)  
45° angle.

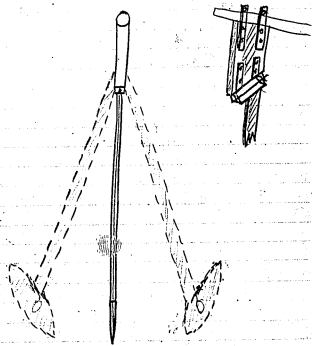
Results were fine.  
Would ride beautiful  
and remain vertical at  
all times, and at all speeds.

Turning boat has no  
effect on it.

Rocked boat from  
side to side, no effect.

No apparent strain  
what ever.

## Effect of angular suspension



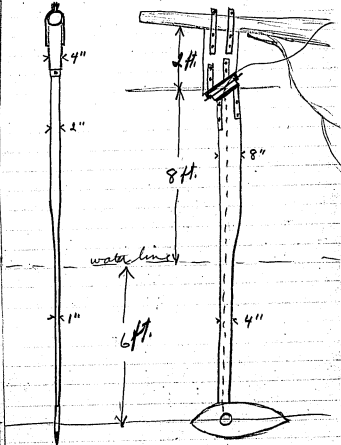
Listened in morning  
at full speed could only  
hear our own boat noise  
that engine off while  
going at full speed.  
Very quiet.  
Absolutely no water  
noise.

Listened for full  
could hear going at slow  
speed for about 1/4 mile.

Induction and boat  
noise down it going at  
full speed.

Engine in launch runs  
very good now since  
magneto was repaired,  
and therefore greater induction  
interference than before.  
When running at full  
speed this induction is felt  
and is entirely.

Description of G. 2. apparatus  
on Sackem.



Description of G. Saffron

June, 7, 1918.

Suspended G. S. from bowsprit of Sackey, as shown in sketch on opposite page.

Seemed to hang vertical, tide was running at the rate of 1.9 knots per hour.

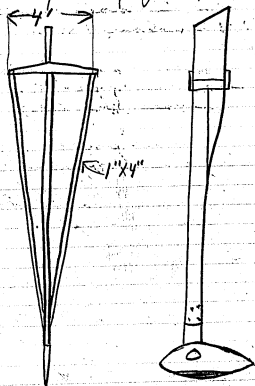
Listened in could hear all kinds of boat noises, Lot of shipping going on. Impossible to get a quietness for any period of time.

No water noises.

Transmitters got water in back of mica diaphragm

disassembled to repair.

Description of G. & apparatus <sup>boiling</sup>



June 11, 1914.

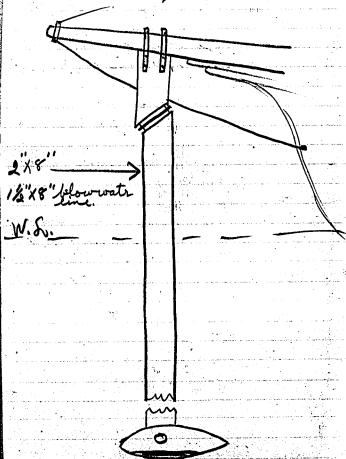
Heung G. & apparatus on  
Sack and made run test  
at 5 knots per hour.

Model would tend to  
raise to surface due to  
flimsiness of upright.

Did not increase speed  
for fear of breaking same.

Braced G. & as shown  
on opposite page.

New apparatus made to overcome flimsiness of G. 2.  
This is designated as H. 1.



Test No. 1.  
Time 9.30 A.M.

June 15, 1918.  
Hudson River  
N.Y.

Tide running out at the  
rate of about 2.6 miles per hour.  
Water slightly rough.

Suspended new apparatus  
as shown on opposite page,  
from Sachem.

Tested res. coil 75.5 W  
ground 10,000,000 V.

Run up river at 5 knots  
against tide.

No water noises.  
Can hear engine  
on Sachem. R. P. M. 116

This apparatus rides  
beautiful, remains  
vertical except when  
still. It swings slowly  
from side to side, but  
gets vertical when boat  
is under way.

Increased speed

to 7 knots.

No water noises

Very quiet

R.P.M. on Sackem 128.

Time

10.46

Can hear wireless signal  
very faint.  
Herald station at  
Battery Park.

Run full speed.

Very good, no

water noises at all.

R.P.M. 151 Engine

very quiet.

Turned boat at  
full speed, without any  
effect on apparatus.

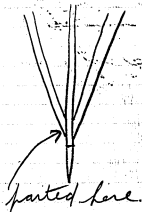
Ridley fine at full  
speed. No apparent strain.

Time

10.55

Going down river  
with tide, full speed.

Can hear other ships  
but there is no much shipping  
going on can't listen for



Tent No 2.

June 15, 1881

suspended braced  
apparatus G. 2.

Run at 3 knots.  
Side brace broke off  
as shown in sketch.

Due to great pressure  
at that point. 1 guinea.



June 18.

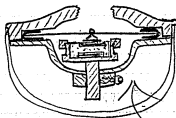
Am constructing the  
following apparatus for  
tests at sea.

No. 1. H. 1. apparatus as  
described.

No. 2. H. 2, as shown  
on opposite page.

No. 3. H. 3. shown on  
next page.

No. 4. H. 1.



construction  
of transmitter

about 7 times more  
sensitive than bell tel.  
receiver.

July 22, 1918.

After experimenting  
with various transmitters  
we found the ordinary  
bell carbon transmitter  
carbon replaced with  
powdered baculite,  
with gasoline to be  
the best.

This baculite is  
powdered, through 160  
mesh screen and on 180  
mesh.

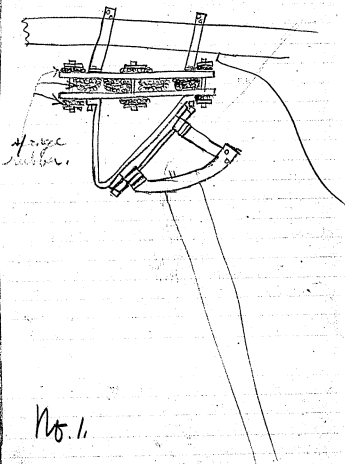
We use 2 cells battery.  
This seems to be  
very quiet and sensitive.  
I can hear suit to  
400 feet as against  
with bell tel.

Gasoline is distilled  
at 75°C. 74°C.  
B.P. 66°C. S.P. 74.3

August, ~~Aug.~~ 13, 1918.

Left Edison Lab. with  
equipment, reached  
Rooster, loaded gear  
and went to St. John's  
provisions for boat, then  
proceeded to Sandy Hook  
N.J. reached there 7 P.M.  
Same date.

# Sandy Hook.



No. 1.

Aug. ~~July~~. 14. 18.

Assembled upper part of apparatus and hung from bowsprit as shown on opposite page.

Tested column for faulty vulcanization and cleavage.

I hung it over side of sacker and let it, in the water, 10 feet deep, for over one hour.

I tested for water with a weight on ashing which I let drop down through mast column.

I done this so if it leaked it could be taken right out of water without getting much of sponges wet.

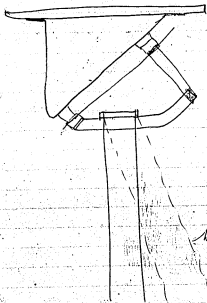
After leaving in the water for one hour

Aug. ~~13~~ 14. 18.

We took out and turned  
up side down.

No water came out  
showing workmanship  
d.r.

Diaphragm also d.r.



low column  
wedged  
clamp  
effort.

Aug. ~~July~~ 15. 18

We left Sandy Hook  
dock at 2 P.M. to make  
sun test.

When Sachem was  
under way the lower  
plate twisted and got  
column out of line.

This is due to the yielding  
nature of the rubber under  
load. Column also wedged  
loose from clamp as  
shown by arrow.

We run at 10 knots  
and twisted in direct  
but, apparatus very  
quiet.

We could only hear  
a few minutes because  
whistling of column pulled  
of rubber tube connection.

We could hear our  
own boat chains and  
there were no water

Am going to change  
superstructure to make  
it more practical  
mechanically.

Aug. 16, 1918.

I am having made  
by the Combination Rubber  
Co. 50 ft. of 2" rubber  
hose, for head in tubes.

This is 3 ply canvas  
inserted.

The cheapest grade  
of hose they make.

• They promised it for  
Tuesday Aug 20.

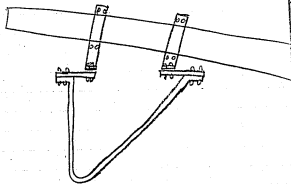




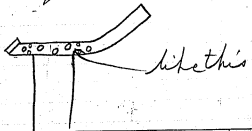
these pieces also keep  
it from wedging.

Aug 19. 18.

I done away with the  
large plates on upper  
structure and built  
it up as shown.



Also screwed clamps  
to base column so it would  
not wedge out.



Aug. 20. 18.

Rubber hose arrived.  
We made elbows and  
connections for same.

Rigged up Auction.

Covered booth with  
cheese cloth.

Charged all batteries.

Sackum went out,  
Captain Harris seen  
the Clio Commander  
about testing sea  
anchors.

We anchored in  
N.Y. harbor over night.

Aug 22/8.

Left N.Y. harbor with  
also sailed up Sound  
to Rye Beach.

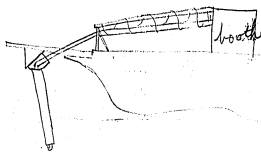
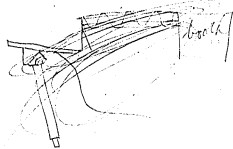
Captain tested sea  
anchors.

Laid off Rye Beach  
all night.

Aug. 23.

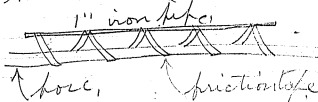
Left Rye Beach for  
N.Y. stopped at E 23rd St  
Let Mr. Flammang off.  
got water etc.

Went back to 86th  
St. instructed Captain  
to store up, and be  
ready to go to Sandy  
hook Monday morning  
early.



Aug 26 '18  
Construction of lead  
tube from Coleman  
to another booth  
← rubber hose  
Sponge rubber wing foot,  
has taking  $\frac{3}{4}$ " hole.

Method of suspending  
hose.



Aug 26. 18.

Reached Fairbush at  
noon, put hickey on and  
hooked up.

Got everything ready  
for a run test.

Left hickey on over  
night for leak test.

The distance from top  
of column to gear piece  
is 50 ft making a total  
of 66 ft from diaphragm

Sandyhook, Aug. 27. 18.

Made run at 5 knots.  
Listened in direct with  
ear tubes.

Sounds very quiet.

Can hear the beats of  
the engine on Sackem.

They are very fast and  
seem to be regular, vary  
from about 220 to 240 per  
minute.

There is no continuous  
roar like we used to get  
before with wooden models.

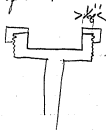
Ship rides to the port  
side a few degrees, this is  
due to improper alignment.

We come into dock to  
correct this before attempting  
to run at faster speeds.

Run out again at 5  
knots.

Rides vertical. A/K.

I made a transmitter  
with the granule cup  
having a surface of  $\frac{1}{16}$ "  
formica to test at  $\frac{1}{8}$ "



regular cups have only  
about  $\frac{1}{32}$ " surface.

27

Increased speed to 10 knots  
I Ender better yet.

Sister in again direct with  
ear pieces.

I hear Sachem plain, no  
other noise.  
boats are very fast  
difficult to count.

Hickey makes a terrible  
disturbance in water near  
water line, due to improper  
streamline form (to blunt  
nose).

This noise is very loud  
when listening in the air  
at board of boat.

But cannot be heard  
in ear tubes.

This construction is  
great for eliminating the  
water noises.

We now run abreast  
of an American cargo boat,  
(just like the Cleo)

We are carrying Ha on our  
port side. Goodness that is the  
side the diaphragm is on.

We count 330 beats  
per minute, these beats  
are very sharp and plain  
and drown our own boat  
~~noise~~

Count 336 beats.

We are dead abreast and  
about 20 syds away, running  
at 10 knots.

We now sheer off from  
Her at an angle to starboard  
for we can hear her.

We signaled him for  
R.P.M. He said 70, 2

We get 330 to 336 sharp  
distinct knocks

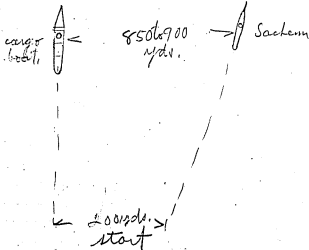


We loose him at about  
850 to 900 yds.

He is going into harbor.  
We had to leave him.

We could not discern  
his noise from our own  
after 850 to 900 yds.

We get distance with  
sextant on the bridge.



27.

Sackins engine turns  
148 R.P.M. at 18 knots.

We count about 300  
beats per minute.

They are about the  
same intensity, and  
occasionally a stray knock  
comes in.

There is 2 beats to  
the R.P.M.

It seems as though  
we cant do much with  
the canceling apparatus.

We are now running  
aboard of an oil tanker.

about 1100 yds away.

beats are now 96 per min

Name of ship (Atlantic)

We ask captain for R.P.M.  
He says, about 105

We get 96 again.

It Our boat sounds

like this. We could cut  
it out, as the beats are slow  
frequency.

We looze when we are  
at 750 yds.

Sachem is pitching  
some apparatus <sup>risks</sup> and  
falls in water about  
10 feet.

This does not bother  
at all.

It changes the quality  
of the noise a little.

We now run abreast  
of another cargo boat.

Name is (Toronto) fuel.

We count 72 R.P.M.

Very clear.

We asked Captain for R.P.M.

He says 70.

We count 72 again.

We are 150 yds away.

We now sheer off and  
looze him at 700 yds.

These boats are very loud in comparison with Sackem.

perhaps it is because we get the sound of some thing at right angles to the diaphragm.

Where in the case with Sackem the propagation of sound is in line with diaphragm.

We breast another oil tanker (Ravitan).

count 108 R.P.M.

Captain says their R.P.M. is 110

We hear of and hear to 700 yds.

We now run abreast of a tug.

hear to 600 yds.  
count 228 beats.

We now breast a whale back oil tanker

27.  
(Great Lake type) <sup>name</sup> (City of Everett)  
We count 73 R.P.M.  
They tell us 73  
We hear to 700 yds.

We now breast a  
passenger boat (Maricabo)  
count 264 beats.  
Hear to 750 yds.

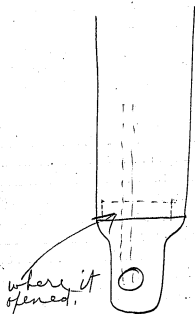
The above data is  
correct as Hayes and myself  
verified each other in each  
case.

We now go into  
Hardy Hook dock.

I took of apparatus  
to examine.

Found that the vulcan-  
izing gave way at bottom  
of ratchet and let water in.

~~We did not notice  
this in listening.~~



where it  
opened.

where rubber is vulcanized  
to the brass.

2).

It seemed to keep its  
absorbing qualities in  
spite of the fact that water  
got in.

We will have to squeeze  
water out and reconstruct  
bottom to be stronger  
mechanically.

Meantime I am getting  
proper brass netting to  
make new section line  
form again.

Sept. 9. 18.

Repaired detector and  
prepared to go to Sandy  
Hook.

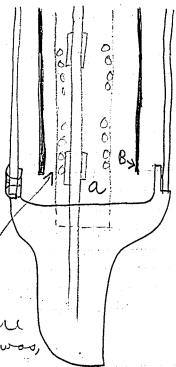
Sept. 10.

Left 8 6<sup>th</sup> St. 8 AM.  
reached Sandy Hook 10:30  
hung detector and went  
out on run test listened  
in direct with ear tubes

Could hear Larkens  
engine.

There is a knock.  
I think it's due to the  
hamp shoe on bottom  
lifting column, this  
knock is very rapid and  
it is impossible to do  
anything.

I had a man go  
overboard and try to  
work the rubber cover  
down so that shoe  
would clear.



where  
knock was,

vulcanizing killed sponge  
rubber and brass marked A  
hit brass column marked B,  
due to vibration of the  
column riding in the water

Sept 10,

This did not seem to  
do any good.

We had to come in  
to dock and take off  
detector.

Disassembled lower  
part found water in and  
also the reason why  
we got the knock.

I repaired and did not  
vulcanize bottom again.  
instead put white lead  
in and screwed on clamps.



Sept. 11, 1918.

Sandy, Ark.

Run out at 10 knotsified  
Hayes counts 200 beats,  
engine is turning 156 R.P.M.  
I get 212 beats.

There is nothing sharp  
or definite about them.

(We are listening direct  
with ear tubes)

Knock We experienced  
yesterday is gone.

Put on Micro. with  
gasoline in gramule cup

Can't distinguish  
anything.

Continuous roar.

Try Bell telephone  
We can't canceling

We hear the beats  
very plain, but they  
are in very rapid succession  
and ~~the~~ all are all the same

in interest.

Can't do anything in  
the canceling line on the  
boat.

Sackem is going in  
dry dock for repairs.

Meantime I am  
constructing new detector  
with better streamline  
form.

Purchased 18 ft of  
#20 Mesh Brass wire .015"  
to reinforce rubber for  
new detector.  
24" wide.

Also brass wire .05" wide  
12 mesh #21 wire.

Had this rubber made  
with wire insertion by the  
Manhattan Rubber Mfg.  
Co. of Passaic.

(CW)

Nov. 15, 1918.

Left Edison Lab. with  
experimental equipment  
for Sachem, lying at ft.  
of 79<sup>th</sup> N.Y.

Nov. 16.

Find things in very  
bad shape on Sachem.  
Will take 3 or 4 days  
to clean and straighten  
things up. Before we can  
leave for Sandy Hook.

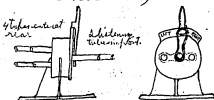
There is no batteries  
on Sachem same being  
in factory for repair.  
expect their return anytime.  
We cannot haul light  
without dynamo running.

Nov. 18, 1918.

Am getting working  
diaphragm apparatus ready  
for experiments, and so  
getting old single diaphragm  
apparatus ready to make  
comparative tests.

I am having made in the lat a double bell three-way valve so as to make it possible to hear a boat on both the left and right side or the left or right side separately.

This valve is to be used in connection with the 4 diaphragm affair (2 diaphragms on each side.)



When lever is in center position both the port and star-board side leads to the two ear tubes. If put to the left side or right side only the respective diaphragms in apparatus will lead to ear tubes.



front view.



inside drum showing construction

Nov 14 1918.

Left 86<sup>th</sup> St for Brooklyn Navy yard to put of sea anemone.

We will wait here for batteries as we can have the Navy yard people install them here.

Nov. 21.

Left Sackham for lab with spectroscope for Mr. Edison. returned same day.

Nov 22.

We decided to borrow batteries from storage battery Co. so that we can go out Monday. We went home for Sunday.

Nov 25

Returned to Sackham and proceeded to Sandy Hook got things ready to make test Tuesday with old apparatus etc.

This is the first model we made.

Nov. 26.

Suspended apparatus from bowsprit, and rigged up tube to booth from same.

I am using a taper tube tapering from  $\frac{1}{2}$ " to  $\frac{3}{8}$ " 2 ft long from top of hatch.

I use the same size tube at booth end taking down from  $\frac{3}{4}$ " to  $\frac{1}{2}$ "

Everything is ready to make a run test tomorrow.

It was late to make a run test today as it got dark at 4:30 PM.

Nov. 27.

We run out from dock at 5 knots speed.

Hayes is listening.

Apparatus seems to be in line, so we increased speed to 10 knots.

Hayes says he can hear the Sachems' heat planes than he could before (in previous tests)

We were running at 10 knot speed for about 10 minutes when brass column doubled up. It bent about 2 ft below suspension.

Upper structure must have been disturbed as it was left in perfect alignment.

Captain Harris said they boat hit this structure while at the Brooklyn Navy yard.

Water was quite choppy  
but not near as rough as  
when we made the previous  
tests with this same apparatus.

We went back to dock  
and removed apparatus and  
then proceeded to get to go  
home for Thanksgiving.

Nov. 29.

Went to Lab and reported  
results to Mr. E.

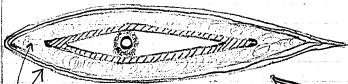
I intended to stay out  
until all experiments were  
completed, but was prevented  
by the Captain and Officers  
to come in for Thanksgiving.

Mr. E. sends for the  
Captain.

Nov. 30.

After discussing conditions  
with Captain Harris in  
Mr. E. library, and the  
Captain having agreed to

The No 2 apparatus is the new single tube affair with the brass wire inserted rubber on the outside diaphragm on the Port side of boat.



This rubber is  $\frac{3}{4}$ " thick and reinforced with #20 mesh brass wire, 0.15"

Sponge rubber made by the Miller rubber Co. 20" sq.  $\frac{3}{4}$ " thick.

remedy things. We arranged to go aboard Sachem Sunday night and go out to hook Monday morning.

Dec 1.

Met Hayes and Burns and proceeded to Sachem arrived at 10. P.M.

Dec 2.

We left 7 AM at 8:30 A.M. arrived at Sandy Hook at 10:30 A.M.

We got our No. 2 apparatus ready and put same on.

Let it stay in the water for disintegration in order to get a test for leaks.

After it was in water about 1 hour I started by letting a weight tied onto a string and let same drop down into the outer casing, and then in the conducting tube.

Found that the casing  
did not leak.

Found water in con-  
ducting tube. (diaphragm leaky)

Raised out of water and  
could not find any reason  
for it leaking.

Probably it was not  
screwed in tight enough.

We cleaned all water  
from tube and put fresh  
white lead on diaphragm  
holder and screwed down  
tight and put hickey back  
in water again.

After leaving in for  
a while made test again.  
Still leaky.

Removed from water  
and examined.

Found that holder fits  
in loose (due to poor work  
manship).



I found one out of a number I had made, to fit snug.

We assembled again using this holder, and tested, out of water, by blowing through tube.

A strong person can blow about 1.5 lbs. per sq. in.

I put soap water on area, so as to detect any leak.

The area is about  $\frac{1}{2}$  sq. in. the pressure on this is about 1.5 lbs. at 6 ft. depth.

The pressure it stood without leaking was 3 lbs. this leaves a safety factor of 100%.

This is ready to put on tomorrow morning.

Darkness sets in at 4:30

Dec. 3.

Tested diaphragm for leaks before putting on, by having Hayes blow in tube and putting soap water on diaphragm to detect leaks better.

Found A.K.

Put detector in position and lined up with the bow of the boat when the former is in a vertical position.

This lining is done by sighting with the eye.

We now start out from dock at 5 knot speed.

Nine 2 P.M.

Weather is very calm.

Hayes is listening direct with ear tubes.

We have a 3 ft long taper tube ( $1\frac{1}{2}$ " to  $\frac{3}{4}$ ") on the hearing end and from top of column to conducting tube which is  $\frac{3}{4}$ " tubing all the way to booth.

Column reads fairly good. It is just a trifle off to the Pat side.

It seems to leak.

quite a wake in spite of  
the streamline form

Hays says He counts  
240 beats of Sacem.

Her Rev. at 5 knots an  
120.

There seems to be a  
steady roar of a very low  
character which makes this  
model more noisy than the  
old No. 1.

The beats are not so  
clear.

Increased speed to  
10 knots.

The wake is far greater,  
in fact almost as bad as No. 1.

The noise also increases

It being a little out of  
line may cause this, so we  
come back to clock.

It gets dark at 4.30  
P.M.

We correct alignment  
so as to be ready to go  
out the first thing in the  
morning.

Dec 4.

Slept calm on all night and am going to test this morning for leak before we start out.

Find casing and tube dry.

Leave dock at 9 A.M.

Go outside the Hook to listen for ships.

We are running at 5 knot speed.

Water is very choppy and rough.

Sackem pitches and rolls a lot.

Hoyes is listening.

Listening noisy.

Rides vertical.

It seems to be in perfect alignment now.

Increased speed to 18 knots.

Noise also increases cant count beats of Sackem.

I dont think we could hear any boats with this noise present.

I listened with ~~my~~ ear  
against different parts of the  
structure of bow sprit to learn  
if any moving part made a  
noise.

Find everything O.K.

I decided to run this noise  
down.

We disconnected lead in  
tube from top of column and  
plugged with a cork to learn  
if it was the effect of the wind  
(which was blowing strong) on  
the rubber hose casing.  
(This casing being affixed to  
the wind)

Listened very quiet showing  
this was not the cause.

We now connect back  
again and shut off engine  
instantly and let boat go  
under her momentum.

Noise diminishes as the  
speed of boat diminishes.

When boat comes to  
rest, this ~~noise~~ <sup>noise</sup> ceases stops  
and the only noise is the  
circulating pump, which is  
very faint.

When this pump is  
shut off, there is absolute  
quietness in air tubes.

This pump circulates

the salt water around condenser coils, and has to be in operation at all times.

It can only be stopped for a few minutes at a time.

We now start again and speed up to 10 knots.

Sackam engine is very plain at first, but as soon as the boat gains speed the clearness of the beats are lost, and it results in this noise.

The noise seems to be what we got with the old wooden models, only of a very low quality.

This is reasonable because of the respective nature of wood conduction and rubber conduction.

I repeated this stop the engine test 3 times and each time the results were the same as above.



Form it  
assumes  
when in  
motion.

Terrible wake and splash  
have when going at 10 knots.  
This is the first we hear.  
It is so great that the sponge  
rubber won't absorb it.

As a result of the fore-  
going tests I come to the  
conclusion that the noise  
is due to the splash and  
wake of the column running  
through the water.

This makes an awful  
noise in the air which last  
evening at the bow of the  
boat.

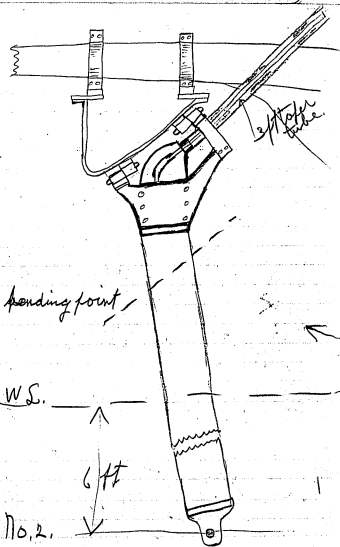
Weather now is very  
rough.

There is a storm brewing.  
The apparatus comes  
completely out of water at  
times, when boat pitches.

Noticed when it  
comes up and down in the  
water that it is deformed  
due to the pressure of the  
water on it.

The wire insertion in  
the rubber is not stiff enough  
to counteract this pressure.

The size of this wire  
is #20 mesh and 0.15" hard brass  
wire.



We were about to come about and the boat gave a pitch that lifted column out of water about 2 ft. and when it was going back it bent about 1 ft below suspension.

This is what happened to the No. 1.

Both bent the same way and in the same place. There is a terrible strain at this point when boat is pitching and running at 10 knots.

We pull up model along side and go into dock and remove

I am getting No 3 model ready.

The wire insertion in this one is 12 mesh #21 brass wire.

This is much stiffer than No 2.



I am sure it will not  
deform due to water pressure.

I will not go out in  
rough weather to make tests  
with this one as it is not  
constructed strong enough  
to stand great pitching.

Meantime we are  
going into Base 6 at Benson  
hurried to get some provisions.  
We lay at anchor here  
all night.

Dec 5.

Left Benson wharf for  
Randy Hook dock at 9 AM.  
It was so rough that  
we could not make dock  
so we anchored off  
hook.

Captain wanted to go  
to #4 supply base to  
get some supplies. He  
ordered some time ago.  
We left Hook at  
1 P.M.

We are ready to continue  
experiments with No 3 as  
soon as the weather is  
favorable.

Dec 6.

Left 24 St. and went  
to Brooklyn Navy yard to  
get (mole supplies)

Came back in to 24 St  
in the afternoon.

Terribly stormy today  
70 mile an hour gale  
blowing at hook.

Hayes and Burns left  
boat at 4.30 P.M.

I left for home 7 P.M.

Dec 7.

Went to Lab to report  
to Mr. Edison.

He said column  
should be long enough  
so as not to come out of  
the water when boat is  
pitching.

Returned to Aachen.  
Captain said storm warning  
was repeated at 4.30 P.M.

Went Home for Sunday.

Dec 8.

Returned to boat 8.30 P.M.

Dec. 9.

We left 24th at 8 AM and went to the Brooklyn navy yard to get a prisoner and some boxes I had made to cover rubber floor. (watered up also)

Left yard for barge dock arrived there at 10.30

Fitted diaphragms in No 3 detector (64 tube, 2 on each side) and put overside of Sackam for leak test.

After leaving in water from I tested by putting weight with string in tubes and casing.

Found casing A.K.

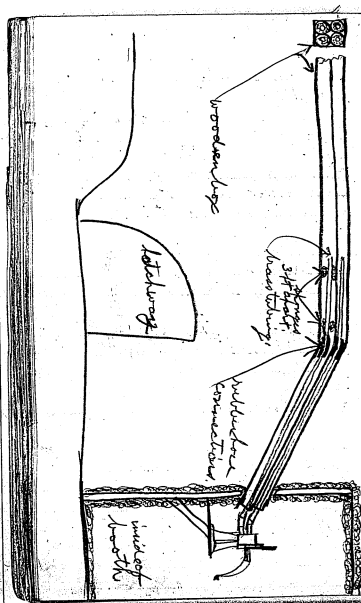
Found that 1 diaphragm leaks.

We take out of water and repaired. (It was not tight enough) and put back again.

After it was in water for 1 1/2 hours, made test again.

Found everything A.K.

Rigged up wooden boxes from bow to bow of boat.



I am putting sponges 3 ft. apart.

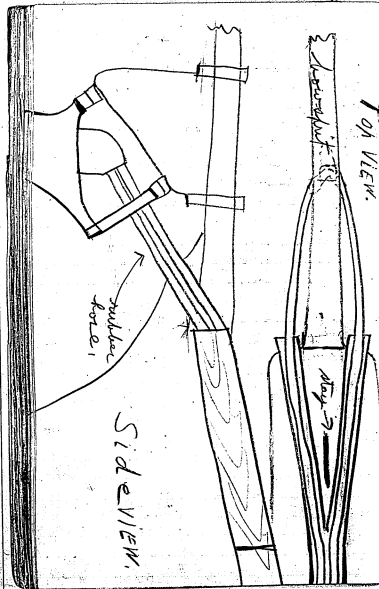
On account of focusing in wooden boxes 1 sponge every 3 ft. is sufficient to hold brass tubing in center. It also increases the outside sound absorbing qualities.

Dec 10.  
Stormy to day, would not take any chances.

Dec 11.  
Very stormy and raining all day.

Left column in place over night.

Tested in morning of Dec 12. everything OK.



Dec 12.

Very calm this afternoon.  
We run out at 5 knots

speed. Colum rides beautiful  
at this speed.

It is in perfect alignment  
and leaves but little wake.  
Distances beautiful.

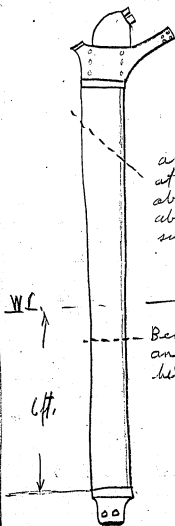
Satchum's beats are very  
clear, the beats of the  
circulating pump can also  
be heard very plain.

I listened in each  
tube to see if all four  
diaphragms were working.  
All 4 O.K.

This beats the old  
No. 1 all to pieces, for  
clearness and quietness.

We were only running  
about 10 minutes, and getting  
valve into place, when  
colum caved in.

It bent in two places.



also bent here  
at an angle of  
about 45°.  
about 2 ft. below  
suspension.

Bent here at right  
angles, about 1 ft  
below water line.

as shown in sketch.

Returned to dock  
and removed damaged  
apparatus and proceeded  
to 79 St. N.Y. 5 North river.

We stayed here all  
night.

## Note

This No 3 model  
held its form fine.  
It did not deform  
due to water pressure  
on the front when under  
way.

## Note

I think the reason for the  
breaking is because of the  
inertia of the upper moving  
parts.

That is they were not  
constructed strong enough.



to resist the inertia.  
The water acts on  
lower part very quickly.

This is proven by the  
fact that the old wooden  
ones would not break  
in any kind of a sea.

There was no appreciable  
weight for them to move.

---

Dec. 13.

Myself, Burns and  
Hayes left boat for  
Orange Pt.

Reported to Mr. E.

Am going to experiment  
to find a better method of  
suspension.

Dec 16.

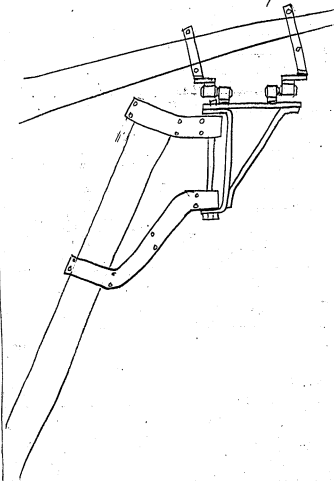
Am laying out some  
work to be done in the  
Brooklyn navy yard.

Am in communication with  
Captain Harris every day.

Dec 21.

Completed drawings and  
went over to factory then went  
to the Navy Yard and got work  
started.

New universal suspension



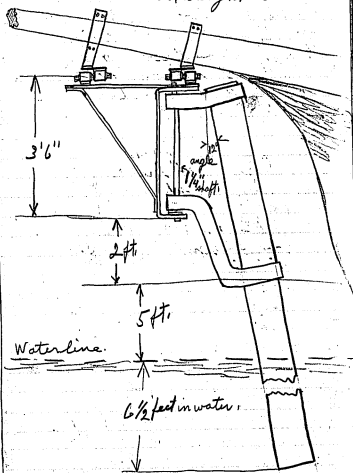
Jan. 2. 1919.

Am getting new suspension  
in place.

Received all parts of my  
job from Navy yard.

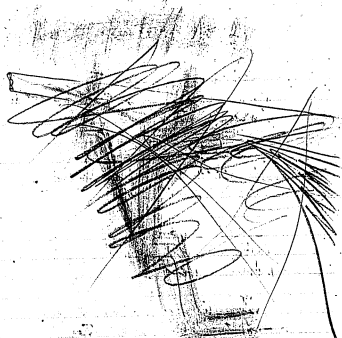
Rig up for test No. 1 like this.

Total weight 520 lbs



Jan. 15.  
After ship fitters finished work on hatch we left navy yard, went over to 24 St (Jan 15) to get some provisions. We then proceeded to sandy hook, arriving there at 5:30 AM.

Jan. 16.  
Rigged up suspension on bowsprit as shown on opposite page. It is very rough here to day, and makes progress of work difficult. However got column in position before night fall. Have everything ready for test to morrow.



Jan. 17.

Test No. 1.

To determine riding qualities of column swinging on a vertical and horizontal axis.

Weather calm.

We left dock and sailed out at a speed of 5 knots.

Column wants to come to the surface, swinging on the horizontal axis.

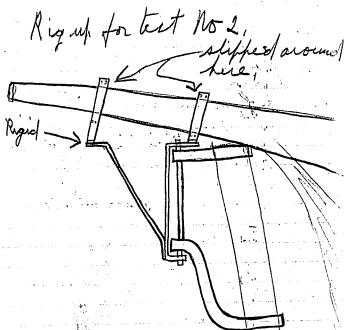
The two axis do not seem to work ~~together~~ together.

It seems as though it should be rigid horizontally.

We did not get this effect with small model in lab.

This universal method is (no good.)

We return into dock and prepare for test No. 2.



Test No 2,  
 Removed horizontal  
 bearings and made rigid as  
 shown in sketch.  
 It is now free to swing  
 only on a vertical axis  
 (Like a boat rudder)

Went out again at 5 knot  
 speed.

Seemed to be O.K.

Increased speed to 10  
 knots.

There is a tendency for  
 it to come to the surface

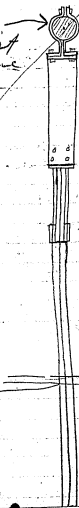
After riding at 10 knot  
 speed for a few minutes it  
 rose to the surface.  
 It slipped on bow spirit

I straightened it up  
 and tried again at same speed

Came to the surface

Front view.

column would twist  
clamps and assume  
a position down  
by this line.



again.

The clamps on the bowsprit is only 3" wide, those are the ones used before in other experiments.

They have not enough of bearing surface to ~~hold~~ overcome the resistance of column.

I think by making those clamps about 6" wide there will be sufficient grip to hold it.

However the tendency to rise remains, when light rools, and it seems as though this method is not very practical with such a long shaft.

# Construction of dummy shaft.

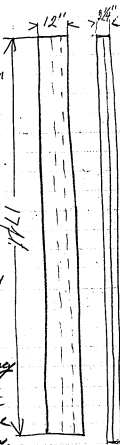
wood covered to  
get proper form



iron bar 17 ft.  
long  $\frac{1}{2}$ " x 5" wide.  
for rigidity.  
weight of bar  
140 lbs.

weight of wood  
about 50 lbs.

This makes a  
negative buoyancy  
of 115 lbs. as  
there is only 6 to  
7 ft submergence  
at normal times.



Jan. 18.

We now come into the  
navy yard. 1030 AM.  
I left for Lab. to report but  
missed my train.  
I will report Monday.

Jan 20.

Reported results of fact  
experiments to Mr. E.

I am having Burns make  
a model of a new scheme for  
suspending shaft.

We are now in search  
of another boat.

Jan 22.

After looking at some boat  
We decided to buy a  
most suitable boat for our  
purpose.

Jan 23.  
Am constructing various  
scale models of vessel to learn  
if form has any effect on sliding.

Jan 25.  
Have Burns making new  
suspension.

Jan 27.  
Myself and Burns went to  
Sackville this P.M. with models.  
I thought for truck to take  
machines from Sackville to Lab.

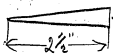
Jan 28.  
We got machine and supplies  
in shape to move of boat.

Jan 29.  
Truck arrived, We loaded  
same and transferred material  
to Hawk.

I went out in the small  
launch in the P.M. to try small  
models. Had Burns along.

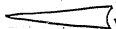


Nos.  
123.



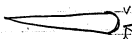
3 of these  
different thickness  
in  $\frac{1}{4}$ ,  $\frac{3}{8}$ ,  $\frac{1}{2}$ ,

Nos.  
34.



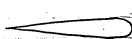
2 of these  
 $\frac{1}{4}$ " and  $\frac{3}{8}$ "

Nos.  
56



2 of these  
 $\frac{1}{4}$ "  $\frac{3}{8}$ "

Nos.  
789



3 of these  
 $\frac{1}{4}$ ",  $\frac{5}{16}$ ",  $\frac{3}{8}$ "

Nos.  
10, 11,



2 of these  
 $\frac{5}{16}$ "  $\frac{3}{8}$ "

The above were all 34" long  
 $2\frac{1}{2}$ " wide. The thickness was  
as shown.

Jan 29,  
I tried all the different  
from models shown on the  
opposite page.

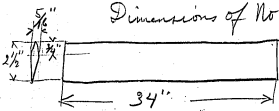
I find that the shape of  
the model has nothing to do  
with the riding qualities.

The resistance of all  
the forms were very great  
it being almost impossible to  
hold them with both hands.

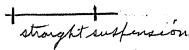
The best one, that is the  
one having the least resistance  
and creating the least distur-  
bance was the No. 10.

This was very easy to hold  
with one hand.

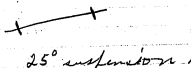
Dimensions of No. 10.



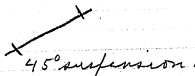
No 1.



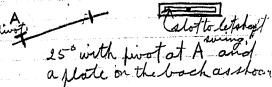
No 2.



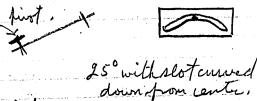
No 3.



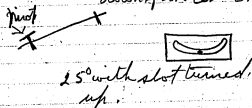
No 4.



No 5.



No 6.



I also tried the different suspensions shown.

I found that column would stay in water at 25° angle, as shown at No 2. but would go from side to side when rocking of boat is initiated.

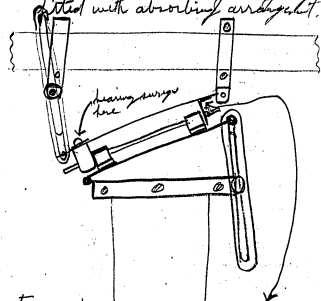
No 4 scheme works very good, the slot in the back bearing allows for this rocking, and lets the column remain straight.

This is a pretty good stunt.

No 3, is terrible. The strains can be plainly seen when rocking.

In a corner  
Am going to develop the No 4 scheme.  
Lift looks good.  
Left Sack for home 7 PM.

Model made so as to get any angle  
desired with absorbing arrangement.



Front.

Colum.

view from  
back of  
absorber.  
springs.

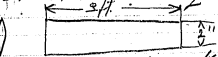
Jan 30,  
Left Lab to go aboard Haulic  
to instruct Captain c/o work and  
alterations to be done.

Jan 31.  
Am making a new suspension  
so that I can change the angle  
from a straight to 45° and get all  
the intermediate angles.

I want to find out the minimum  
angle that column will ride at.

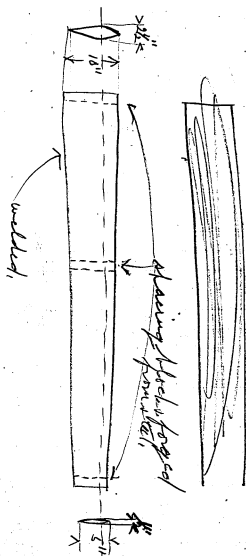
Feb 4.  
Have this ready to try on  
small launch as soon as it gets  
turned over to Haulic.

Feb 5.  
I made some scale models  
from sheet brass to demonstrate  
the twist and bending.



this is very rigid.

1/16" brass



Feb. 6.  
I moved from No 4 Bldg.  
to No 1. Bldg.  
Am having room No 3 fitted  
up to carry on experimental work.

Feb. 8.  
Am laying out a one half  
size column to use on small  
launch with new suspension.  
(on opposite page.)

As will be noted this will  
take both ways.

It is made of  $\frac{1}{2}$ " machine  
steel, with three spacing  
blocks at equal distances.  
It is welded along front  
and back seams.

Feb. 10.

Went to Hauoli at Benson  
hurst to get my tools.

I also brought over 3 ft  
model and suspension.

Feb. 12.

Received word from MacBarr  
that launch was turned over.

Feb. 13.

Left for Bensonhurst to  
try model out in small boat.

Captain Harris takes command  
of Hauoli, and Capt. Grosz  
leaves boat.

Feb 13.  
I made the following tests  
in launch in the afternoon,

Test No. 1,  
Tried streamline columning  
in a horizontal position.  
This would raise out of the  
water (I expected this)

No 2.  
Tried at angle of  $5^{\circ}$   
Would still come to surface

No 3,  
Tried  $10^{\circ}$  angle.  
The tendency is reduced  
noticeably.

No 4,  
Tried  $15^{\circ}$  angle.  
This is much better.  
The absorbing arrangement  
works fine here when imitate  
rooling by thrusting bowsprit.

No 5.

Tried angle of  $20^\circ$   
This is fine the column  
stays vertical no matter what  
I do with bow, i. e. (load or  
pitch)

No 6.

tried  $30^\circ$  angle.  
This seems not quite so  
good, it seems to be too much  
angle.

The  $20^\circ$  seems to be the  
point.

I tried again at  $15^\circ$  to  
see if I could reduce it any  
but  $15^\circ$  is not quite  
enough.

It acts sluggish.  
 $20^\circ$  is fine. I observed  
it working at this angle a long  
time.

The absorbing student is  
A.K.

This is quite an advantage  
to reduce from  $45^\circ$  to  $20^\circ$

as it eliminates a lot  
of strain.

The shock absorber takes  
care of what little strain there  
is left.

All the above tests were  
made at a speed of 10 knots,

Model is much more steady  
when at a rate of 50 than  
when vertical.

There is a little vibration  
when vertical.

Now come in and go  
home.

I left instructions with  
Capt. Harris to get it landed in  
good shape as I will be  
ready to use it in a few days.



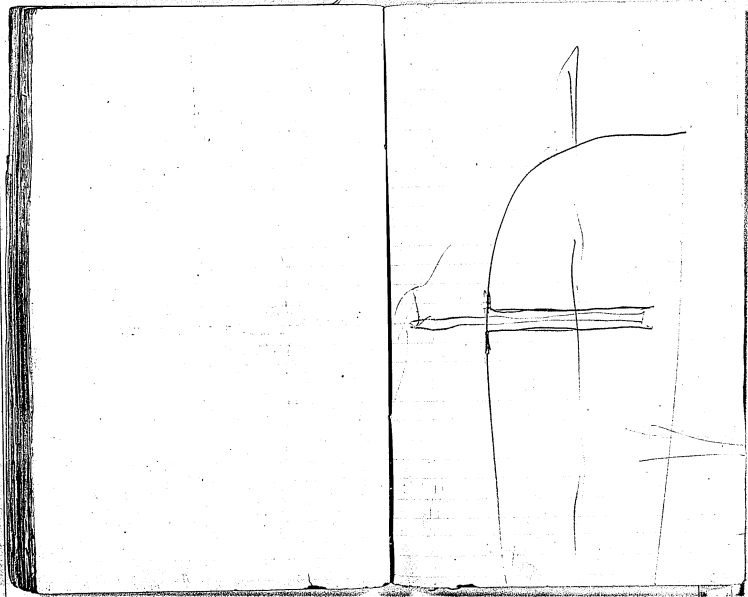
Feb. 14.  
Burns has 8 ft column  
finished except smothering of  
a little.

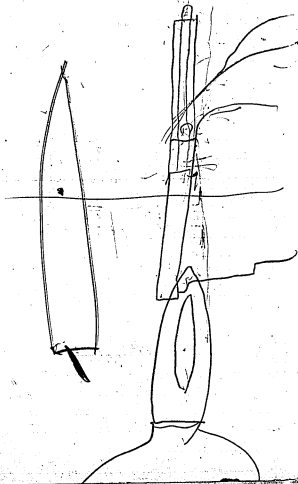
This is a very rigid affair  
does not twist or bend.

I tried to twist with a 2  
ft. lever on bottom but  
could not notice any twist.

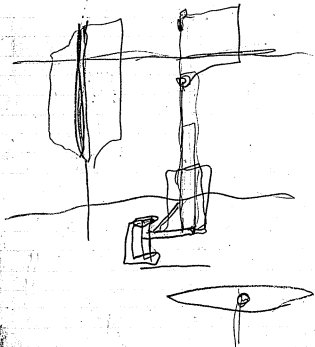
I am laying out an  
absorbing suspension to  
put on burned to try out  
for riding on same in a  
rough sea.

Continued in Book No 2.  
Sub. detector experiment.





res of No 1 Transmitter.  
 69 ohms before putting in water.  
 res of No 3 Transmitter.  
 76 ohms before putting in water.  
 No. 2 18 ohms.



**Notebook Series -- Notebooks by Experimenters Other Than Edison  
Navy and Wartime Research Experiments -- J. A. Hanley Books  
Notebook N-19-02-15.2**

This notebook was used by John A. Hanley during February-September 1919 for experimental notes on submarine detection. Most of the entries pertain to tests conducted at sea on detection equipment. The book ends with the note "Burns to do this. I am to continue on Storage Battery job." The notes indicate that Hanley was reporting to Edison through William H. Meadowcroft. The front cover is labeled "Experiments. Edison Submarine Detector. No - 2. From, Feb. 14-19, To." Numerous loose pages relating to these experiments have been inserted into the book. The pages are unnumbered. Approximately 125 pages have been used.

*J. Hanley.*  
*Edison Lab.*  
*West Orange*  
*N.J.*

75428  
*Home Co.,*

MFG. STATIONERS,  
96 JOHN ST.  
AND  
19 PLATT ST.  
NEW YORK.

Cont. from book No. 1.

Feb. 15.

Am making a report of work  
and experiments to date, to send  
to Mr. Edison

Feb. 17.

Gave Mr. Meadows a  
report to send Mr. Edison.

Feb. 20.

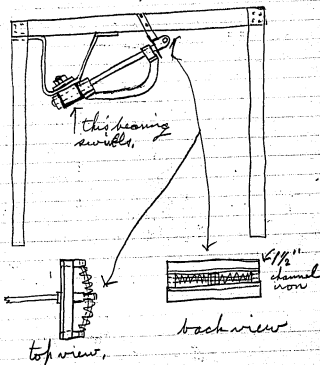
Went aboard the Hawk  
at Bensonhurst.

Capt. Harris said the navy  
people did not want to make  
the desired changes in regard  
to fitting up a ship.

So we decided to let it go  
as the work in the future will  
be of a large nature, and  
could not be done very  
well on a boat.

Am going to have small  
lathes come back to the lab and  
set it up in No. 1 Bldg.

Am also having tools etc.



returned to lab.

Feb. 24.

Finished work on suspension and setup in lab as shown on opposite page.

I did this so that I could find any defects (if present) before putting it on launch.

Feb. 25.

We shipped apparatus to the Hancock, now at E 23rd St. N.Y. and had the material aboard returned to lab.

Feb. 26.

Burns and myself fitted the outrigger to launch. (on next page.)





There does not seem to be any strains or twists as was noticed in the other tests (45° suspension)

This is a very severe test.

I think if we had this affair at 45° something would be broken by this time.

We come in after about 6 hours of running.

The springs in the absorber were not hardened, and due to the continued use, they became shortened.

I am going to have some more springs made and hardened and continue tests.

March 9.

We went aboard and put a new set of hardened springs in place.

We then proceeded for a run test.

Springs seem to be a little short so we return and put longer ones in.

We now go out again.

Works very good now.

We run down the river and get in the wake of ferry boats and large river steamers. We also get in all kinds of cross currents and launch got tossed about like a cork.

At times the whole affair goes under water and then

completely out.

There is no effect on column at all,

It remains vertical.

It seems as though it's almost impossible that any thing can stay at on the bow of a boat under such conditions,

I think it would outlast about 6 launches.

We return after running about 7 hours and 30 minutes and remove from launch.

I am going to set this affair up in lab. so that Mr. Edison can examine it when he returns from Fla.

March 4,  
I got sufficient dimensions  
of bough of the Hauli to  
lay out an outrigger trans-  
verse column, had Burns along.

She has no bow-sprit  
like Acheem had.

Am compiling a report to  
send to Mr. Edison.

March 5.  
I am laying out structure for  
bough of Hauli.

Burns is fixing up lathe in  
No 1 bldg.

March 11,  
Burns works for Hayes.

March 12.  
Had Burns go over to Hauli  
in Ford truck to bring back  
8 ft. model.

March 14.  
Burns is listing the returned material, tools etc.  
We return a list of same to stock room.

March 15.  
I sent drawings of affastens for the Hancock to Mr. Edison for his approval. (to Ft. Meyer Fla.) meantime I am laying out all the parts in detail.

March 14.  
Received A.K. drawings from Ft. Meyer.

March 26.  
I got a letter from Mr. Meadowcroft to Admiral Bland and went over to the Navy Yard with some also drawings.

Had Jimmy Burns start to make the templates to form column by.

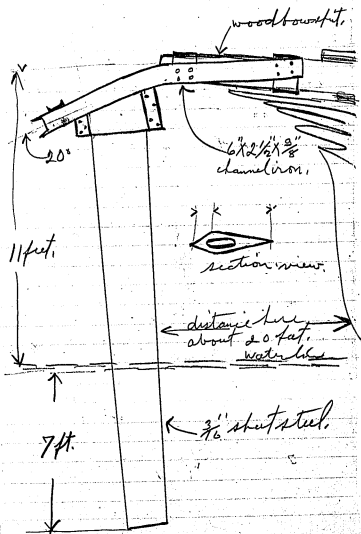
March 27.  
Capt. Harris and myself went to Navy Yard, I gave letter to Admiral Bland. He got Kimmery and we handed it over to the engineering Officer to be started at once.

March 29.  
I take templates over to Navy Yard.

March 31.  
I am laying out an instrument to record the behavior of the boat as to rolling and pitching.

This instrument is to be used in experiments of the future.

This will enable me to keep take and keep record of the action of the boat to compare with the action of the column.



I go over to the yard about every second day to see about the works progress also to explain the different drawings. The rest of the times I put in on the records.

April 17.

The parts are mostly ready to fit on to axle.

Now people have order to go ahead and fit the axle on.

See Mr. Edison.

April 18.

Capt. Harris came out to lab.

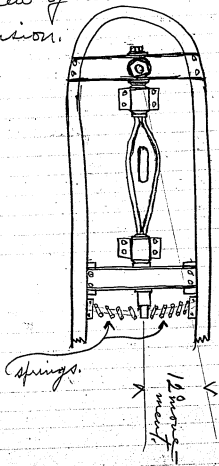
April 21.

Capt. Harris and Mr. [unclear] went aboard the ex German submarine V 111.

They would not allow anyone below deck.

The Chief Electrician said that the listening apparatus

top view of absorber and suspension.



was taken of and smashed up by the English.

I guess the Germans did not consider the listening proposition essential in connection with the efficiency of their subs.

Apr. 25.

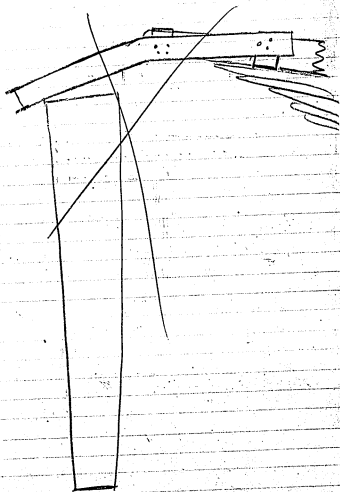
Am having six springs made and hardened from different sizes of material to be used in connection with absorber.

Apr. 26.

Old bowsprit was taken off Hancock to make way for new one.

Apr. 30.

The battleship Tennessee is being launched at Navy Yard today.



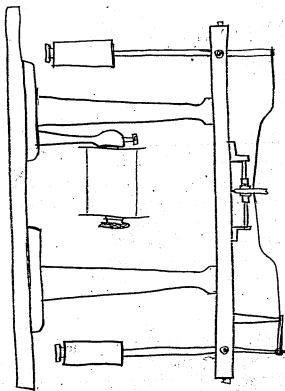
May 5.  
The apparatus is finished  
and is lying at dock, near the  
Hauler.  
It is ready to put on.

May 12.  
Furnished Engineering Office  
of the mill division with  
drawings and order as requested.

The above was required  
before work could be started  
as first order covered only the  
construction.

May 13.  
I went to yard, brought two  
sets of springs for abutment.  
Yard men are putting out  
rigger and column in place on  
the ship and expect to have it  
finished by tomorrow noon.





May 14.  
I went in lab and got things in readiness to go aboard the Hgwoli. I seen Mr. Edison and told him we were going to New London Conn. to see the Zelesea, at the same time test the riding of column.

Also asked to take Burns along.

We left Lab at 11:55 AM. in Ford car with recording instrument, tools etc.

Arrived at yard at 1:20 PM.

Left dock and got under way at 2 PM.

After maneuvering around the yard for about one half hour we proceeded to Buzzards Point and anchored there for the night, it being too late to go to sea. (4 PM)

We are going to take the outside course so as to get as near to the actual

We hit a log of wood while coming down the bay. This could not be avoided. I did not do any damage.

conditions as possible. The column behaved very good while under way at full speed.

It had quite a severe test while we were maneuvering around in narrow channel, and the East river as we had to back up at full speed at times.

Of course we could not expect to raise to the surface when backing as the river gave this phase of the proposition any consideration.

→ The above run being made in the river and lower bay it was fairly calm there.

I set up recorder in the chart house of the Haweli, so as to have it ready for operation tomorrow.

Myself and Burns inspected the suspension while at anchor and found everything all right.

May 15.

We pulled anchor and left Bensonhurst at 7 A.M. and proceeded to sea for New London (outside course)

The sea was quite rough (choppy) and boat pitched and rolled considerable, as shown by recording instrument.

There was a very stiff West wind blowing.

Speed was from 12 to 14 knots.

The apparatus worked fine.

~~The~~ At 5:10 P.M., one of the bronze bearings broke away.

We were pitching severely at the time.

~~The~~ Upon examination of the bearing found that it was a very poor casting, being mostly dirt.

The apparatus rode comfortably for 10 hours under

severe conditions all the time  
This is shown by records.  
This accident happened off  
Montauk Pt.

We removed the column  
from on the jigger and placed  
on deck, then proceeded to  
Fort Pond Bay to anchor over  
night, it being too late to go  
to New London.

We dropped anchor in  
Fort Pond Bay at 8 P.M.

The above test was by far  
the most severe test we put any  
affair to so far.

May 16  
We started from Fort Pond  
Bay at 6 A.M. and arrived at  
New London at 8 A.M.

The weather was fine and the  
water very calm.

I took a record of the boat  
behavior to compare it to  
yesterday's record.

New London, Conn.  
The Captain Burns and  
myself went to the experiment  
station fore to see if we  
cant get a new casting so  
as to continue test on way  
back. We took in other  
casting to use as pattern.

The People here said  
We could have it by Monday.

We then went up the  
Thames to look for the *Zebrina*  
After locating and inspecting  
her. We found that she had  
been in collision and that  
14 feet of her haunch was

taken away and consequently  
she is out of commission.

We learned that it  
would take at least two  
months to put her in commission  
and she has very poor  
acomodations <sup>also</sup>.

She would not be  
suitable for our work at  
all.

I went to town in P.M.  
and sent telegram to Mr. Elson.

I bought some oil etc  
for recorder.

Also made some new  
pens so that I could get  
roll and pitch simultaneously.

We are lying at anchor  
in the channel under.

The recorder is a very  
valuable affair.  
Certainly works fine.

May 17.  
The finished bearing  
was sent to the Hamoli from  
the experiment station.  
It is too late to put column  
on. We will coal up and  
water up Monday morning  
and then go out in the Thames  
and anchor and put column  
in place.

May 18.  
Sunday.  
We observed the Sabbath.

May 19.  
We went to dock for coal  
and water, left New London  
at 2:30 P.M., arriving at Fort  
Pond Bay at 4:30 and anchor.

After correcting the align-  
ment of the bearings as best we  
could, we put the column in  
place using the anchor tackle  
to do so.

We got everything in readiness with the exception of putting springs in absorbers. Dockman having set in and making further work impossible.

I took a record of the ship's behavior while coming across block island sound. It was a beautiful day and very calm on the water.

There were groundswells present as shown on records.

I listened in on the Handley's listening gear while coming across the sound. (M. tube)

All that could be heard was a continuous roar, which I think was due to water noise.

This roar was constant regardless of the position of the compensator.

There was no centering or binoral effect.



The engine of the Hauoli  
could not be heard plainly.  
Could not count the R.P.M.  
I had a graduated listener  
on board, listen in.  
He could not hear anything  
except the roar.  
He said that this type of  
apparatus was never any good.  
That is it could not be used  
while ship was underway.

May 20.  
Everyone awoke at 5:30 AM.  
to get ready to get underway.  
We put springs in the  
absorber and got the affair  
working in good shape.  
It moves very freely now  
from side to side.  
We started from Fat Pond  
bay at 6:30 AM.  
The weather was very clear  
and water was very calm.  
Swells were present.  
There was a slight east  
wind blowing.

The absorber could not work to its full capacity Thursday due to the binding of the bearings.

This also helped in great measure to break the bearing.

After getting around Montauk point we take a steady course, West by South.

The absorber works very good now. The action is much more pronounced now since we aligned the bearings.

The binding is not present that was experienced Thursday.

The absorber is constantly taking care of the boat's vibrations.

We sail at a steady speed of 13 to 14 knots.

We have a lookout stationed at the bow of boat no 2 as to notify if anything goes wrong or if we approach Long Island.

About 2:30 PM when we were approaching New York we increased the speed of the Hawoli to 16 to 17 knots.

The compass rides just the same. There is no difference [11]

in the riding condition at  
this high speed.  
Of course the wake the water  
line is greater.

When running at high  
speed of 15 knots there was  
present a distinct note which  
was very loud.

This is due to the column acting  
as a reed.

Everything seemed to be  
in right proportion to produce  
this note.

The note was D.

The covering of upper  
will of course change this con-  
dition.

I bored a hole in the wooden  
plug in top of column, and put  
a set of ear tubes in to listen to  
the noise of the wake.

There was a steady roar  
due to the wake left behind  
column, I guess a lot of this

noise is due to the surface friction also.

When column would hit a ship or any small ~~surface~~ object in the water, it was very loud in the ear tubes.

It seems as though this noise was no greater than the noise experienced in the M.V. tube affair on Hanoi.

I took records at various times during the day.

Coming in New York harbor, W. hit a log of wood about as large as a railroad tie. This could not be avoided.

The column broke it in two pieces.

This shows the apparatus can stand quite a severe blow.

The speed was about 13 knots.

We arrive at 79th St and

north river, and tie up to dock there.

In the test of the above few days, the column was on boat while under way for 23 hours. The maximum speed attained was 17 knots.

The records show the ship's behaviour, heading, location etc.

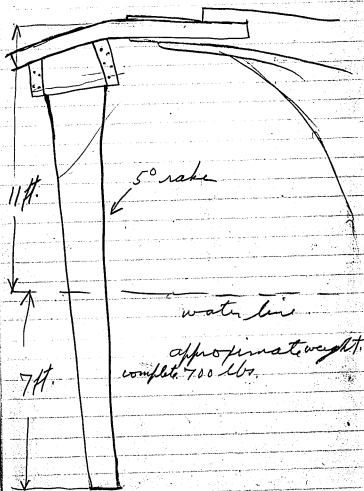
This test is by far the most severe we have put any affair on board of a boat yet.

While running at 17 knots speed one of the springs in the column became strained and shortened up.

This however only affected column ~~to~~ to the extent of a few degrees ~~that~~ from the vertical.

This would in no way impair the operation.

I will have new springs made to overcome this.



Myself and Burns leave for home at 7 P.M.

The sketch shows the arrangement and dimensions of the apparatus.

May 21.  
Went in lab. and reported results to Mr. E. also gave him report on Felucia.

Am having a new set of springs made for absorber.  $\frac{3}{8}$ " steel,  $\frac{5}{8}$ " pitch, 5" long. Acquired from Mr. Knox of the Manhattan rubber Co. of Passaic. if it was possible to make wire inserted rubber  $\frac{1}{2}$ " wide. answered in the affirmative.

I ordered 15 sheets of sponge rubber 20" sq. from the Miller rubber Co. of Akron Ohio.

Am having made brass

wire netting No 12 mesh No 21  
and No 22 wire by the City  
wire works.

The wire we used before  
was No 21 each way but the  
City people said it would be  
impossible to get No 21 wire at  
the present time, and that they  
had plenty of No. 20 and 22 on  
stock.

The combination of 20 and  
22 is practically the same in  
every way as the No. 21.

May 22.  
Burns called at lab for  
springs and I met him in New York  
and we proceeded to New York,  
arriving aboard the Hawaii  
at 79<sup>th</sup> St. at 11 P.M.

May 23.  
We put the springs in the  
absorber in the morning.  
It was very foggy and we  
could not go out until noontime

The fog lifted around that time.

We left dock at 12 o'clock for a test outside, sandy hook.

The sea was ~~very~~ choppy and a stiff wind of about 25 miles was blowing.

The Hanoli pitched and rolled a lot as shown by the records.

We took a record of the boats behaviour for the whole trip.

We took all sort of courses in order to get the maximum roll and pitch.

We put the affair through a very rigid test for about seven hours.

The absorber works much better with the new springs.

The whole affair would submerge at times and occasionally raise completely out of the water.



It seems to me that we could not put it to a more severe test.

I listened in on the M.V. tube on the Hanoi when we were trying to

There were a lot of water noises due to the boat rolling and pitching.

I heard a tramp steamer about two miles.

We then sailed ahead of a tramp steamer.

Speed of each ship about 10 knots.

200 yards away.

Could not hear anything except the roar due to water noises from Hanoi going through the water.

I gave the job up as the diff is absolutely useless when ship is underway.

We now sail into dock at 79th St. arriving there at

7 P.M.

Today's test was seven hours continuous running at a speed of 13 to 14 knots per hour.

The total time column was on bow of Hauli while under way was approximately 30 hours which is equivalent to about 400 miles.

The maximum speed attained was 17 knots.

I am now convinced that the principle of propulsion is O.K. and that the affair will stand up in any kind of a sea that the Hauli can stand.

Will have column removed from bow as soon as I get some photographs taken to show the construction in cut

the column to the Hanoli.

I wrote up a typewritten report of complete test for Mr. Edgson.

Purchased a scrap book for keeping behavior records.

May 26

Went aboard the Hanoli (by automobile).

Had Burns and Linder along.

Had Linder take photographs of column.

We then removed column and placed on the dock. Had a truck ordered from Lab. to take same in.

We return at 3 P.M.

We also take recording instrument back to make a better motor for same and

to make some other changes.

May 27.

Am laying out the shoe  
for bottom of column.

Burns checked up the record  
er.

May 28.

Had an operating table  
made to finish up the column  
on.

Had photographs of  
recording instrument taken  
in various positions.

Am arranging records  
in scrap book.

May 29.

Burns is making ten  
guides for putting tubes in  
column with.

Am having new irons  
made for top of column.

June 2,  
Am having four taper  
tubes made as shown on  
opposite page.

June 3,  
Am laying out a new  
motor for recorder.

June 4,  
Got word that we could  
keep the Hauloli.

June 5.  
Had new irons put on top  
of column and had bearings  
thinned up properly in shop.  
I went to the Hauloli to get  
measurements to make new  
crossmembers, the old ones  
were bent due to the improper  
alignment of the bearings.

Am having a portable  
sound proof booth made  
in lab, as shown on opposite  
page.

June 6.  
Am making an attachment  
for recorder to rule the  
ordinary adding machine  
paper with.

June 12.  
We need about 1000 feet  
of paper to use in future  
tests.

June 13.  
I gave Mr. Meadowcroft  
report and photographs of appar-  
atus to send to the Navy Dept.  
as requested by Mr. Edison.

Tape tubes are finished.

June 16.  
I had a letter sent to the  
Miller Rubber Co to hasten the

shipment of sponge rubber.

June 18.

Booth is finished.  
I am continuously after  
the Esty wire people in regard  
to the wire netting which we  
have not yet received.

June 20,

Received the wire at 2 P.M.  
brought same over to the  
Manhattan Rubber Co. and  
got a promise of one week  
on the job.

The specifications of the  
wire are as follows.

18 feet long.

48 inches wide.

#12 gauge.

Not 20 and 22 brass wire.

weight 6.3 lbs.

72 sq. ft.

June 23.  
Am having elbows of the  
proper angle made to use  
in connection with large  
rubber pipe from top of  
column to booth.

June 24.  
I went aboard the Hauoli  
to bring letters to Capt Harris  
also to get measurements and  
to find a place for booth.

June 25.  
Ordered 4 10 ft. lengths  
of 5 ply gas hose from the  
Combination Rubber Co.

Am having steam line  
laid to table for vulcanizing  
rubber.

June 26.  
The new motor on recorder  
runs  $7\frac{1}{2}$  hours with one  
winding at 500 R.P.M. of  
governor.



July 30.  
Wire inserted rubber  
arrived.

Cut same and prepared  
it for putting the sponge  
rubber on.

Burns is making clamp  
for shoe.

July 1.  
Sponge rubber arrived.  
I prepared same for cement-  
ing to the wire inserted rubber.

Purchased  $\frac{1}{2}$  gal of  
Scales vulcanizing cement  
for this purpose.

Burns worked on shoe.

July 2.  
Cemented sponge rubber  
to the wire inserted rubber  
using one coat of Scales  
cement.

Patte on vulcanizing.

July 3,  
Prepared margin  $1\frac{1}{2}$  inches  
wide on each side of sheet  
rubber for vulcanizing.

Laid a strip of rubber  
on each margin.

Applied one coat of Sholin  
cement after sand papering and  
cleaning with benzol.

→ June 7.  
Done vulcanizing.  
Purchased 1 doz. rubber  
sponges from Minor Rubber Co.  
in Newark.

July 9.  
Fitted tubes to Ashre and  
bound and soldered same to  
prevent rattling.

Placed a sponge at every  
3 ft. length on tubes and  
installed in column by the  
use of the tin chute previously  
made.

Laid out a bracket to  
clamp rubber to top of column.

July 10,  
Drilled holes in the rubber  
at bottom for putting shoe on.  
Put same in place using  
white lead in screws, and  
between rubber and brass.

July 14,  
Installed Dittaphams in  
shoe, using white lead on  
all seams & joints, etc.  
4 1/2 in. rubber hose arrived.

July 15,  
Finished clamp on top of  
column.

Ordered 4 1/2" brass tubing  
to use as connectors for  
rubber hose.

Am having spacing clamp  
made to use on the 1st & 2nd  
so as to make a clear passage  
way between cables and  
stays for tubes.

July 16,  
Got brass tubing 4 1/2 in. cmf

also  $\frac{3}{4}$ " soft rubber tubing.

July 16.  
Myself and Burns are grain-  
ing up lots of records to leave  
in painting crate made to  
ship column.  
Captain Harris called up.

July 17.  
Tried to get Capt. Harris  
on phone but could not.

July 21.  
Mr. Meadows left had  
truck ordered to leave for Tuesday  
morning.

July 22.  
Shipped apparatus by truck  
to the launch at Sachawanna  
dock at Hoboken.

Myself and Burns went by  
auto with recorder etc.  
Went from Hoboken to  
93rd St. and anchored in the  
Hudson.

July 24.  
We are installing the  
new parts on the outrigger  
hauled to Sandy Hook  
dock.

Am having a derrich  
made for the purpose of  
lifting column from  
water to test also for putting  
same in place on the outrigger.

July 29.  
Put column in water at  
10 A.M.

Tested for leaks by letting  
a weight attached to a string  
drop down each tube.

All diaphragms, joints etc.  
are water tight.

Let it stay suspended from  
derrick in the water for 24  
hours. tested and found OK.

We did not put column  
in place today because the  
Hauli was jolting up and  
down, the water being rough.  
There would be danger of the  
outrigger catching on column  
and causing damage.

July 30.  
Put column in place and  
assembled the absorber.

Put elbow in place and  
cut rubber and brass tubing for  
connecting to the booth.

July 31.  
We left Matdy Hook  
dock at 8 A.M. to get provisions  
for Hauli.

The column rides very  
good.  
The rubber bulges out  
stream line form distorts  
at the water line due to the  
pressure of the water.



The heavy outline is the original form with respect to the steel column or backbone.

Dotted line shows form the rubber assumes when ship is underway at 10 knots.

This causes a terrible wake behind column.

It also causes undue strain on the whole structure.

Speed was about 10 knots.

It seems to be O.K. at 5 knots.

Arrived at Bensonhurst at 9:30 A.M.

Decided that it will be necessary to make clamps to keep rubber from bulging out.

It would also be advisable to make a <sup>small</sup> guard for the nose of column in order to distribute the pressure which is great at the water line, also to protect rubber from coming in direct contact with sticks and other floating debris in the water.

There is a lot of debris floating in the water at times and it is impossible to steer the boat clear of same.

Tested tubes for leaky at end of run. found O.K.

I also inspected the form of the rubber from waterline to shoe, and found that the greatest distortion was just below the waterline, it was O.K. near the shoe.

Will return to lab. and make gaug. and clamp.

Aug. 1.  
Went in Lab. and ordered  $\frac{1}{2}$ " and  $\frac{3}{8}$ " sheet brass for delivery today.

Aug. 2.  
Had small commercial car ordered to take stuff to Bensonhurst Monday morning.



Aug. 4.

Met Burns at Newark and purchased some more  $\frac{3}{4}$ " rubber tubing, also brass screws. Proceeded to Bensonhurst arriving aboard Hauli at 11:30 A.M.

After coaling ship and watching we proceeded to Sandy Hook dock, arriving there at 5 P.M.

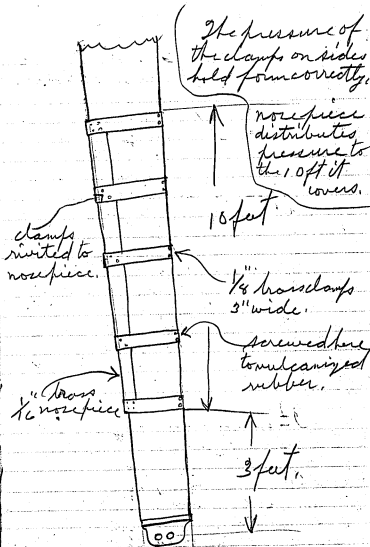
Went slow (40 knots) so as not to distort rubber too much.

Aug. 5.

Rigged up derrick, removed boom from outrigger and placed it on the dock.

After straightening the rubber we formed the nose piece and clamps.

Riveted clamps to nose piece.



The column has been in the water until now for 168 hours. It did not leak a drop. Harold has been under way about 5 hours of this time.

Aug. 6.  
Finished clamps.  
Put column in place at 11 A.M.

Left Sandy Hook dock at 2 P.M. for Bensonhurst.

We run at about 5 or 6 knot speed because of a dense fog.

Column rides O.K.  
It does not bulge out at water line now.

Coming in Bensonhurst we run at 10 knots for a short time.  
Everything is O.K.

The column leaves quite a wake at 10 knot speed, in spite of its stream line form.

Water was very calm. We did not take any behavior records.

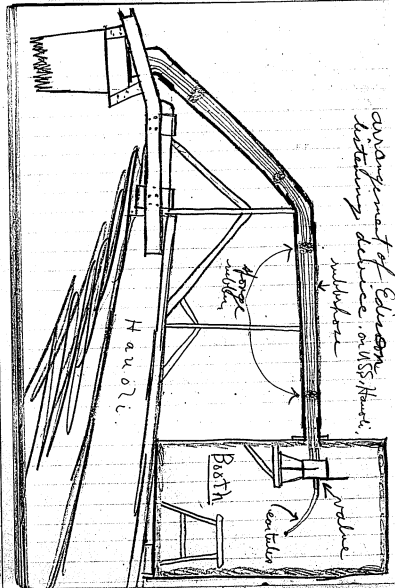
While under way at half speed, I sat on the outrigger and listened in.

Very quiet, could hear the Hancock's engine.

Due to the position I had to get in to listen, I could not count R.P.M.

The noise of bow wave through the air also bothered me.

Arrived at Bensonhurst at 4 P.M.



Proceeded with putting  
on the tubes from top of column  
to booth.

Tested tubes for leaks.  
Found OK.

Aug. 7  
Put the booth in place  
on the bow of the Hawaii.

Connected up the tubes  
and the rubber hose cover-  
ing.

Got every thing in shape  
to go out tomorrow.

The distance from the  
diaphragms to the ear pieces is  
34 feet.

Hooked in the port and  
starboard valve in the  
booth.

Using metal ear tubes.

Gravesend Bay, N.Y.

Aug 8.

Prepared to get underway to make a run test to determine the noise of wave (water) noises and to get comparison of noises between our device and M.V. tube on H. a. v. l.

I am listening in.

Am using the combination 3 way valve, and the (Ct) all metal ear tubes, 12 inches long, tapering from  $\frac{3}{4}$ " to  $\frac{3}{16}$ "

Pull anchor at 10:45 AM.

Very noisy.

Anchor chain running in house pipe makes this noise.

Water is very calm in bay. Beautiful day.

Recorder is not running. Had trouble with glass pens breaking, and did not

have time to repair.

10:50 Start main engine at

quiet. Device listens very

Hear a submarine chaser  
crossing our bow a few  
hundred yards away.

I am listening in port  
and starboard sides.

I count 90 faint beats  
of Haroli engine.  
Captain says engine is  
turning 90.

The beats are very faint  
and hard to pick out.  
The noise is almost a  
slight roar.

There is no water noise

at this speed.

I now listen in M.V. tubes  
at same speed.

Tubes are very noisy.  
Lot of water noises.

Engine noises are louder  
than in Edison device  
but not as clear

(noise is louder only  
when centered).

Beats are not as dis-  
tinct as in Edison device.

I now listen in Edison  
device and have speed  
increased to 10 knots.

Noise increases a little  
the beats are in rapid suc-  
cession now.

Almost a constant roar

(No.) water noises.

All the noise heard is engine noise, and this does not seem to be very strong.

Seems to be distant.

Now 5 knot speed.

The noise diminishes somewhat. (Lower frequency)

Port diaphragms are very quiet.

Starboard are a trifle noisier.

This is due to the column inclining a few degrees to the starboard of the vertical.

Will have to put a large spring in the port side of the absorber.



Now listen in on the  
M.V. tube, and increase speed  
to 10 knots.

Terrible water noises,  
Especially when Hawoli  
rolls or pitches a little.

It would be absolutely  
impossible to hear a ship  
over the noises heard in  
those tubes.

Noises are present regardless  
loss of position of the  
compensator.

Noise is sickening.

We reduce speed to 5  
knots.

I listen in on Edison device.

I hear bell. 10 rings per  
minute.

Captain Harris says its  
a submarine bell on the Amb-  
rose light ship,

Port side, S. is two miles to our

We are sailing away  
from her at 5 knot speed,

This bell is very  
loud and clear,

Hear overtones clearly.

Burns listens and  
hears it.

Captain Harris listens  
and hears it.

Also Ensigns Allen  
and Taylor,

I hear a tug boat.

Count 100 R.P.M. very plain

and loud,

Tug boat stops about  
 $\frac{1}{2}$  mile away,

I now hear a tramp  
steamer.

We are still running  
at 5 knots speed.

I hear tramp steamer  
over one mile.

Also hear bell, etc.

Had. Captain shut down  
main engine and all  
auxillaries, pumps etc.

We are now lying too

We are rolling and  
pitching a little.

There is absolute quiet-  
ness in ear tubes.

Pitching and rolling  
does not cause the slightest  
bit of noise.

When I state absolute  
quietness, I mean it in the  
full sense of the term.

Engineer now starts  
the auxiliaries and main  
engine in the following order  
at a time.

Main exhaust to condenser.	1:25 PM
Circulator.	1:25
Feed pump.	1:25
Air pump.	1:25:30
Generator.	1:26:30
Blower engine.	1:26:30
Main engine.	1:30

The generator makes the  
most noises of all the auxiliaries.

The main engine drowns  
out the other pumps etc.

The main engine noise is a steady roar with a beat just having a distinctness that can be heard above the roar and can be counted.

I count 92 beats.

Engine R.P.M. is 90.

The noise seems to be distant.

This is due to the position of the diaphragm with respect to the point of sound propagation, and to the fact that we are running from the sound.

The device is in the proper position acoustically.

It would not be necessary to do any cancelling out.

Am still hearing well.  
Running at 5 beats.

Hanoi is pitching and  
rolling to some extent.  
This does not interfere  
with listening whatever.  
Except that as the column  
rises and lowers in the  
water, the quality of the  
sound varies a little.

Only the quality.

I now listen in MV tubes

Terrible noise here  
at 5 knot speed.

Can't pick up the bell at all

I go back and listen in  
Edison device.

We are now 5 miles from  
ship with bell on.

I hear it very plain now

Burns hears it.

Captain Harris hears it.  
Ensigns, Allen and Taylor  
also hear it.

Captain Harris and myself  
hears bell plain and loud at  
6 miles distance running 5 knots

We got distance by bearing  
of charted buoys, etc.

We now turn around and  
run head on to light ship at  
10 knot speed.

I am listening to pick up  
bell.

When Hawoli runs at 10  
knot speed, her bow vibrates  
up and down a lot. This causes  
the brass tubes to jump up and  
down in the rubber hose.  
Tubes hit hose at times  
and this is bothersome.

Will have to put more

sponge rubber supports in  
hole for tubes to overcome  
this.

However I picked up the  
bell at 2 miles distance  
running at 10 knot speed,  
and heard it for 2 miles after  
passing it.

Best ever.

When within a few  
hundred yards of wreck ship,  
I listened in M.V. tubes but  
could not hear the bell.  
Could not pick it up at all.

We now come in so it  
will be necessary to fix up  
the tubes, before we can get  
any further data accurately.



We come in at 5 knots  
speed so that if column  
hits anything it won't be  
liable to damage.

I pick up a tug boat on  
the starboard beam about  
1300 yds distant, very plain  
80 R P.M.

This is the best device  
that I have ever listened in  
on. it certainly is remarkably  
quiet and entirely free  
from water noises.

Burns, Capt. Harris  
Allen and Taylor listened  
on both the M.V. tube and  
Edison device.

They said there was no  
comparison.

The Captain requisitioned  
a range range finder

from the Navy Department  
for the purpose of getting  
accurate distances in  
the future experiments.

All Naval Reserve Men  
and duration of war men  
will have to be released from  
the Navy by August 11<sup>th</sup>, this  
will leave the Hancock  
with a crew of only 41 men.

The captain has in a  
request for enough men  
to make up an operating  
crew so as we can con-  
tinue experiments.

It will be Tuesday  
at the earliest before we  
can make any further tests.

Gauvencot Bay,

Aug. 19.

Removed the ~~flange~~ <sup>flange</sup> con-  
taining glass tubes and put  
another sponge in each  
length making 4 sponge  
rubber supports in one  
length and 3 in the other.

Corrected alignment so  
that column will ride  
vertical.

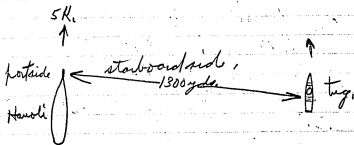
Made out a report to  
send to Mr. Edison.

Buns left for home.

Aug. 11.

I went in lat. with report.  
returned to ship in afternoon.

Buns returned in evening.



Could not hear tug on the  
port side.

Groveland Bay N.Y.

Aug. 12.

Fixed up needles fore and  
aft, and got it in working order.

Went out to listen for  
ships.

Left anchor at 11:30 A.M.  
Sail out at 5 knot speed.

I am listening in port and  
starboard sides.

Water very calm,  
just hear Haulis engine.

I hear a tug boat about  
1300 yds to our starboard beam.

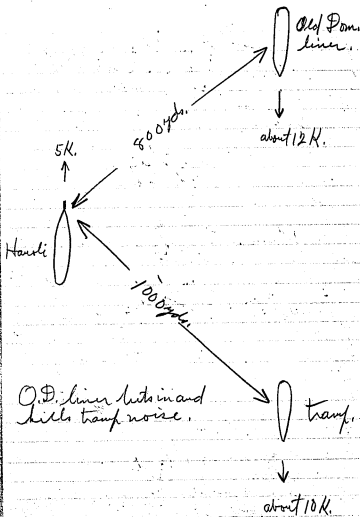
Can't count R.P.M. (his)

They are mixed up with our  
own boats R.P.M's.

Can't discern him on our  
port diaphragms.

I hear a bell buoy.

The bell is not clear through  
the tubes, it sounds like a dull



thud,  
I guess it is the sound of  
the clapper transmitted through  
the framework into the water  
(The hell is in the air)

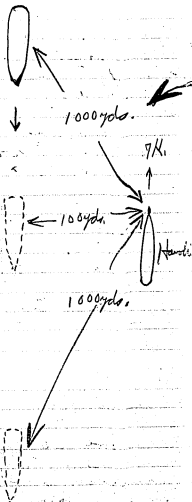
Can hear the thud much  
sooner than the ring through  
the air.

I hear a tramp 1000 yds to  
the starboard steam.  
Count 88 R.P.M., very loud.  
264 beats (very rapid).  
Propeller is out of water.

An old Dominion liner  
buts in.  
Hear her plain, 72 R.P.M.  
Beats are slow, very loud.

I hear a liner on the Port  
bow, 1000 yds distant.  
We pass her 100 yds to beam.  
I lose her 1000 yds to  
port beam.

Liner,  
running about  
12 knot speed.



We are running 7 knots  
now.  
I count 153 beats (51 R.P.M.)  
Beats are fast.  
There is one very loud beat.

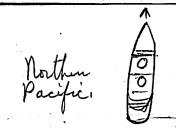
Hear another ship 1000  
yds. to port bow.  
Count 240 beats.  
60 R.P.M.  
Loose at 800 yds to port  
steam.

(Similar to previous case)

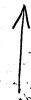
Hear Ambrose lightship  
bell very plain. 10 rings per  
minute.

We are now running at  
5 knot speed.

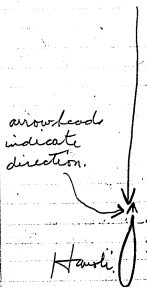
I hear a very loud roar.  
It's the Northern Pacific  
maneuvering to take on a pilot  
500 yards away.



Northern Pacific  
running  
about 17 to 20  
knots



2 miles.



arrowhead  
indicate  
direction.

Hawli

Hawli running at  
5 knots.

Terrible noisy, cracky,  
steady roar,  
~~the~~ the turbines.  
He stopped.

We turn and run from bell.  
I want to get distance that  
I lose it on our steam,  
Running 5 knots.

Northern Pacific starts up  
again.

Very loud noise.  
Something like a torpedo  
only of a lower character.

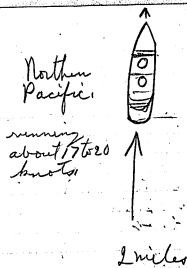
Still hear bell.

N.P. is 1500 yds away to  
our bow.  
Very loud yet.

I hear N.P. to 2 miles away.

Other ships butt in.

Can't hear bell any more.



arrowhead  
indicate  
direction.

Hauli

Hauli running at  
5 knots.

Terrible noisy, cracky,  
steady roar,  
the hauler turbines.  
the stopped.

We turn and run from bell  
I want to get distance that  
I lose it on our steam,  
Running 5 knots.

Northern Pacific starts up  
again.

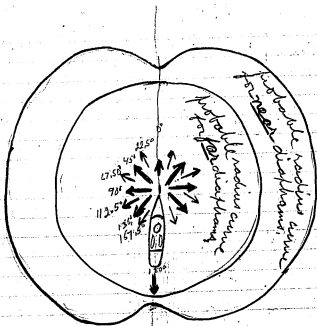
Very loud noise.  
Something like a torpedo  
only of a lower character.

Still hear bell.

N.P. is 1500 yds away to  
our bow,  
Very loud yet.

I hear N.P. to 2 miles away  
Other ships butt in.  
Can't hear bell any more.





Get distance sound can be heard at all the above positions at 5 knots speed.

Get nearest diaphragm distance and for diaphragm distance.

Then get distance at various speeds.

too many ships around interfering.

I lost bell at 4 miles distance. I wanted to get the distance bell could be heard when Haveli was running to and from it at different angles, as shown on the next page.

Also wanted to see how the sound diminishes as the speed of Haveli is increased.

It will be necessary to get this data electrically, so that we can confine our tests to a closer area to the source of sound, and to eliminate the interference of other ships.

(Cut down sensibility!)

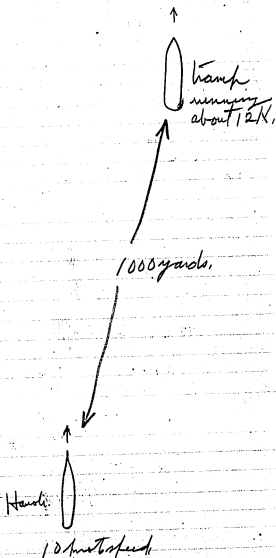
Can't do this out here today.

We wait a tramp steamer.

We run at 10 knots speed.

I count 165 beats.

He stopped to take on a Pilot.



She starts again and we  
run after her at 18 knots speed.

I hear her for 10.00 yards  
to our bow.

She is running much  
faster than we are.

Other ships interfere such  
as tugs etc.

Can't do much out here  
today.

We now come in.

Had recorder running  
It run about  $\frac{1}{2}$  hour  
and, one of the main springs  
broke.

I will go in lat. tomorrow  
and get electrical apparatus  
1 stage auction etc.

Captain says He will go  
to Navy Yard to get range finder

Gravesend Bay.

Aug. 13.

Lab. Myself and Atkins went in to

Brought the following material by Ford car to Hauler.

1 Stage and ion.

3 Bell receivers.

2 Head sets (receivers)

Weston volt ammeter

2 Rex boxes.

50 ft. wire.

2 and ion bulbs. V type.

2 straps of  $\frac{1}{8}$ " brass.

Photographing for records.

Gaveend Bay.

Aug. 14, 19.

Repaired spring in recorder  
and got same in running con-  
dition.

We intended to go to Sand-  
Hook today to put on extra lights  
on column.

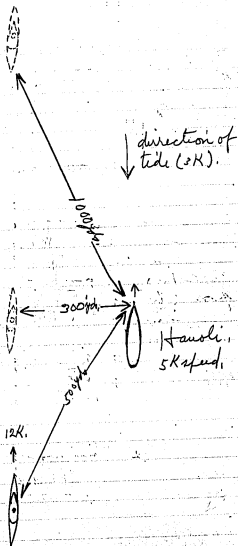
It is so stormy that we  
could not tie up to the dock  
there so we decided to go  
to 79<sup>th</sup> St. dock on the North  
river.

We left Bensonhurst at  
2:45 P.M. en route the blower  
engine broke down.

We were towed in to our  
dock by a navy tug arriving  
at 7:30 P.M.

While we were coming in  
the lower bay running at 5  
knot speed a U.S. submarine  
(S-3 No 107) overtook us.  
She passed us on our port side  
running at a speed of about 12 K.

USSub.  
S-3 No 107



I listened in and heard her about 500 yds. to our port stern, she passed about 300 yds. abeam.

I lost her at 1000 yds to our bow, a tug interfered between Hawoli and Sub.

While in tow coming up the North river the same submarine passed us coming down the river.

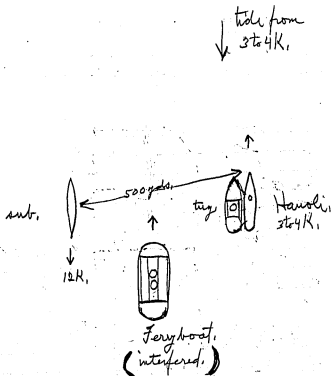
We were being towed at about 3 to 4 knots against a tide of from 3 to 4 knots.

Sub was running about 12 knots.

I heard her when she was about 500 yds to Port beam.

Ferry boats and tugs interfered.

The sound was a steady roar similar to the sound of the Northern Pacific, but of a somewhat lower character.



Aug. 15,  
Rigged up derrick on 79<sup>th</sup> St  
dock and removed column from out-  
rigger.

Found that the base shoe  
on the bottom of column was bent  
to one side.

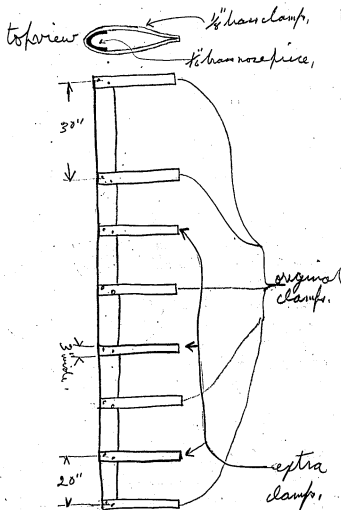
This was caused by the anchor  
chain hitting ~~it~~ <sup>when</sup> hauler  
was swinging <sup>and lifting</sup> ~~while~~ at anchor  
in Gravesend Bay during the storm  
of the 13<sup>th</sup> and 14<sup>th</sup> of Aug.

We removed the shoe entirely  
by from the column to straighten  
the tubes.

We also removed the nose  
piece with clamps on.

Found a large dent in the  
press nose piece where it had  
come in contact with a piece of  
wood.

If it were not for the fire



traction of the clamp, the rubber would have been injured.

We put three more clamps in place on rose piece as shown on opposite page for the purpose of further protection and to give column a better form.

Aug. 16.

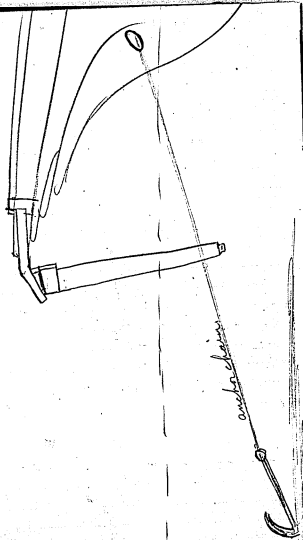
Removed kink and straightened up the lower part of tubes where they were bent.

There was no damage done as the result of the chain cutting the rest of the column.

The rubber covering is still intact.

Purchased screws and white lead to assemble shoe again.

In the future we will have to keep tied up to a dock as much as possible, the chain in order to hold a ship while at anchor in (MS-3)



a storm it is necessary to let out anchor chain to a length of about 3 to 4 times the depth of the water. When the chain is tight it lays at a sharp angle and this would always be dangerous to our apparatus.

During calm weather the chain lays on the bottom as the weight of same is mostly enough to hold the ship.

Myself and Burns left the home in the afternoon.

Captain Harris had the broken parts of blower engine sent to Nantux for repair.

When repaired we are going to Sandy Hook dock.



Hudson River New York.

Aug 18.

Myself and Burns returned  
to Hauli.

Wet weather today.

Aug 19.

I went in Lab. to see Mr.  
Edison.

Burns is putting new  
clamps on nose piece.

Returned to ship in the  
afternoon.

Fixed up diaphragms in  
the brass shoe.

Aug 20.

We put lamps in place  
on column, also put shoe  
in place and got every  
thing in readiness to move  
to Sandy Hook dock.

Two more men left the  
Hauli today leaving only  
19 men in the crew now.

Fixed up a bank of lamps  
to ~~provide~~ assistance in  
charging batteries for the  
auditorium.

Engine parts have not  
returned yet.  
Expect them tomorrow.

Aug. 21,  
Repaired engine parts  
came from Navy Yard.

We charged our batteries

Captain got a letter state  
ing that range finder has  
been shipped from Washington.

We are now waiting  
for coal.

Order of tests, to get sufficient data on device.

- No. 1. Get speed of the Hauler, relative to the engine R.P.M.  
(Do this before putting the column in place)
- No. 2. Get ranges of audibility of device at various angles off ship with respect to the source of sound.  
(Use some constant source of sound).
- No. 3. Get ranges of audibility at various speeds of ship.

Sept 14/19.

Left Sandy Hook dock at  
8 A.M. proceeded outside to-  
wards Ambrose lightship.

Count 80 RPM of Haveli  
engine. (very close)

Hear a tug very loud  
about 300 yds, to our star  
board side.

Increase speed of Haveli

I count 160 RPM.

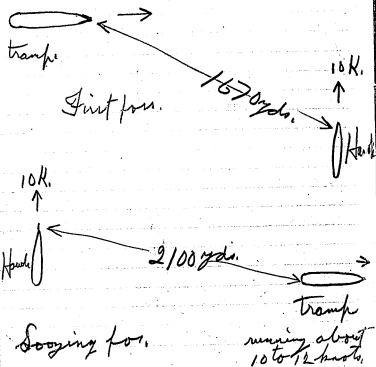
(160 RPM is 10 knots)

Noise heard is purely  
engine noise and does  
not seem to be very strong.

Weather is fine today.

Water is calm.

I hear a tramp steamer



Soaring for.

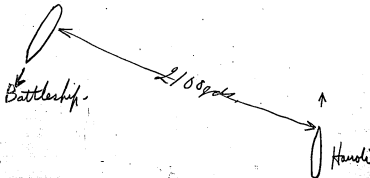
sailing at right angles to us, crossing our bow. I pick up the sound at 1670 yds.

I hear her plainly to 2100 yards, to starboard.

Cannot count her R.P.M. They are mixed up with ours.

I pick up the sound of an Italian battleship at 2100 yds. distant.

There are other ships around that interfere now.



Going head on to  
Ambrose light ship.

I cannot pick up bell

Bell not ringing.

We asked Captain to ring  
bell.

Bell started at 9:43 A.M.

We start away from light  
ship at 9:45 A.M. at 10 knot  
speed.

Bell is terrible loud/near  
by. Can be heard about 1 foot  
from ear tubes.

12 dings per minute.

We want to get the point  
where we loose bell running  
away from it at 10 knots.

this is not right. —————  
as speed fell below  
10 knots.

We are now 5550 yds.  
from bell running at 10 knots.  
Bell is very clear and loud  
yet.

RPM decreases to 145  
(Can't keep steam up in the  
engine room) for coal.

We are out of sight of light  
ship, can't get range any more.

Lost bell after listening  
for 40 minutes.

At 10 knot speed the dis-  
tance should be

→ 14,815 yds. or  $7\frac{1}{2}$  knots.

We stopped engine.

I hear bell again very  
plain.

We continue course

away from bell at 5 1/2  
speed. 98 RPM engine.

We have to get distance by  
the position of ship on chart

This distance I hear  
bell at 5 knot speed is  
indicated on chart by the  
numeral II

This distance is approx-  
imately 6.5 knots.  
or 13.171 yds.

We now continue to  
sail away and stop main  
engine to learn distance  
bell can be heard.

(But leave auxiliaries  
running)

This position is shown  
on chart by numeral II  
and is approximately 7.5 knots.  
or 15.197 yds.



We now face head on  
to bell, to determine the distance  
in the opposite direction.

Lying too (auspiciousness)

No. 2 is position, 20

We now present our  
port beam to light ship.

I hear the bell very faint

It seems to be about the  
same intensity at all the  
above positions.  
(Lying too)

We now sail abreast of  
of light ship, back and  
forth coming closer each  
time.  
speed 5 knots RPM. 90.

Position 3 on chart  
shows distance. 7 mi. 14/82 gds.

We start at a buoy that  
is exactly 8106 yds from  
the light ship.

Sail away with steam  
to light ship to repeat the  
first test.

Speed 10 K. RPM 15-4.

Hooge bell suddenly  
3000 yds from buoy.

The distance is 11106 yds  
from light ship.

Position 4 on chart shows  
this distance, which is 5.4 knots  
or 11106 yds.

We now reverse course  
and head for light ship

time 1:21

Speed 10 knots.

1:26 2100 yds

1:27 1610 "

1:29 1150 "

I cannot hear the bell  
any more. (Not ringing)

We run in to the light  
ship.

We pull along side of  
light ship and ask keeper  
what time he stopped his  
bell.

He said 1:15 PM.  
This is time I lost bell  
at 3000 yds from buoy.

Captain asked keeper to  
continue ringing bell until  
we return.

Bell starts at 2:32.

We run away from ship  
at 140 RPM. ... & make speed.

Increase speed to 10 knots  
at buoy 4 miles from bell

120 R.P.M.

Hear bell 2400 yds. ast  
buzg. 10506 yds. from light ship.

Turn ship and head for  
bell, at 10 knot 160 RPM.

Pick up bell 2400 yds. from  
buzg.

Sail ahead of light ship.

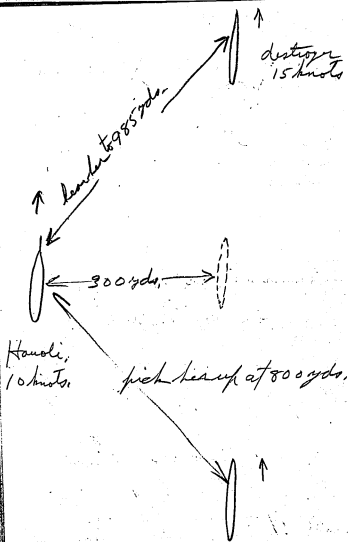
Hear bell at 2400 yds. from  
buzg. 10 knot speed. 160 RPM.

We now run in near  
light ship, to listen to some  
ships.

There are not many ships  
running here today.

We are getting information  
to listen to a U.S. Destroyer  
No. 153.

She is overtaking us on  
our starboard steam.



We are running 10 knots  
160 P.M.

She is running about 15 K.

I hear her 800 yds to starboard steam, and hear her to 985 yds, to our starboard bow.

Sound steady roar.

(Turbines)

He passed up at 300 yds, to our starboard beam.

Terrible loud at this point.  
(roar)

A destroyer cannot be heard at a great distance. It must be due to their shallow draft.

We get all the distance with the range finder.

Barr & Stroud make

F.G. type No. 11. 42 inch base.

Northern  
Pacific!



pick her up plain at  
3500 yds.



Hear her  
1.5 knots

Big passenger boat coming  
out.

Hear her dead ahead at  
3500 yds.

We are running 10 knots.

Very loud at 2250 yds.  
drown out our own boat noise  
entirely.


She stops to drop Pilot.

Terrible cracking noise  
can't listen to it. (continuous)  
cracks.

We stop, and wait for her  
to start again.

It is the Northern Pacific.  
(Turbines)

Hear pilot boat running  
Northern Pacific starts up  
again.

↑  
  
 Northern  
 Pacific  
 running about  
 15 knots

just hear her at 3500 yds.

↑  
 Handi.  
 10 knots

We are 690 yds. from her  
 We start up.  
Terrible racket  
 We follow her at 10 knot  
 speed 1.60 P.M.

Noise getting weaker.  
 Still very plain and  
 discernable at 2700 yds.  
 Scratchy noise like diaph-  
 rams rubbing along sand.

I hear her to 3500 yds.

All the foregoing data  
 was obtained by listening  
 direct with ear tubes.  
 (No amplification)

I will construct charts  
 to show the relative ranges  
 of audibility at various

speeds of ship.

Also the ranges when  
ship is at the various pos-  
itions relative to the point  
of sound propagation.

Below are some of the ranges  
on bell for quick reference.

Max. distance lying too.

<sup>11.5</sup> Miles (Quartz)  
1519.7 yds.

Max. dis. at 5 knots.

6.5 Miles  
13171 yds.

Max. dis. at 10 knots.

5.45 Miles  
11106 yds.



Return to Sandy Hooklocks  
arriving at 6.30 P.M.

Removed device from  
outrigger and sailed into  
the lower bay.

anchored overnight.  
in lower bay.

Sept. 15.

Proceed into dock at  
Brooklyn Navy yard to  
coal up.

Myself and Bunn left  
Hawaii for Lab.

Reported to Mr. Edison.

He wants all lab.  
equipment removed from  
Hawaii.

Bunn is to do this.  
I am to continue on

the storage battery job.

[ITEM(S) FOUND IN BOOK]

May 18  
6

start New S. and land  
2:35 PM ~~stop~~  
roll and pitch record  
change over.  
stop at.  
blue ink in roll  
red is pitch  
stop at 2:40 P.M.

Race point light, 3:20  
stop record, ~~3:30~~ 3:30  
heading 60 S 1/2 E.  
change course due S.  
4 to 7 min 30 sec.  
south wind.  
change course S 1/4 W, 4:5

May 19  
2

Block Island sound  
change course S 1/2 W.  
4:12

3:19 PM changing  
course continuously  
enter F.P. Bay. 4:21  
~~stopped and~~

stopped engine 4:30  
dropped anchor at 4:32  
stopped records, 4:36  
maneuvering.

[ITEM(S) FOUND IN BOOK]

ing 20 mi.  
 off Pond Bay, at 6:32 AM  
 start record. 6:33  
 water dead calm.

start full speed. 6:35  
 speed about 12 K,  
 light east wind.

B. sound.

6:55 1/2 A.M. changing course  
 airplanes stopped 6:56

changing course 7:2

7:3

change course SE 1/4 E.

7:4 1/2 A.M.

Montauk light ahead

7:19 1/2

swells

approaching outside 7:24 1/2

changing course 7:25

May 20.

No 2

about 2 miles out in ocean  
 of Montauk Pt. 7:32  
 heading SE 1/4 E.  
 RPM of engine 7:40 AM  
 200.

heading SE 1/4 E 7:43

changing course 7:44

West by South 7:46 1/2

sailed ahead of the

swells on W by South course

beautiful weather.

slow at 7:58

stop record 8 A.M.

course W by S, con-  
 tinuously.

[ITEM(S) FOUND IN BOOK]

No 3. May 28  
 stat record at 11 AM,  
 ship's position, 7 miles West  
 of Shinnock light  
 heading, W. by S.  
 Eng. R. P. M. 210.  
 stop record at 11:30  
 ship's position <sup>Ball's Pt.</sup>  
 heading W. by S.  
 ← 1.8 miles S. V. of Shinnock  
 light.

No 4. May 28.  
 3 P.M. about 7 miles  
 East of Ambrose light  
 ship's heading  
 W. by N.  
 starts to rain.  
 Ambrose light ship 340  
 made 16 knots for a time  
 around 320  
 Change bow to 430  
 entering narrow 432  
 slow speed 440  
 half " 441  
 full " 441  
 Lower bay 448  
 Pass station light 459

[ITEM(S) FOUND IN BOOK]

No 5. M<sub>2</sub> 20.

approaching Nothine.

5-14

reach ~~at~~ at 5.45

79

trip to dock. to water up.

[ITEM(S) FOUND IN BOOK]

Data for May 28

[ITEM(S) FOUND IN BOOK]

New York  
May 23, 1919.

start 12:22 P.M.,  
coming away from dock  
about 15 mile wind,  
heading S.W. down  
the North river.  
water calm in river.  
R.P.M. of engine 175

It was very foggy in  
the river.

fog lifted about 11 P.M.  
12:25 P.M.

wind is increasing in  
velocity, direction S by E  
(about 10 miles)

of station  
12:27 P.M., heading SW by S  
12:30

2

up the N.Y. Bay, 12:45 P.M.  
heading 92, 45 S.S.W.  
changing course  
1 P.M. Narrows,  
slow speed 1/2 P.M.  
lay to 1, 8 P.M. off H. M. L. with  
start again, 1:14 P.M.  
1:15 P.M. W. of in bow  
wave of Moro Castle.  
South of N.Y. Bay,  
wind about 25 miles  
1:23 P.M.

wind about 25 miles  
white caps present 25  
kts.

heading S. 1/4 W. 1:30 P.M.  
Ambrice Island



[ITEM(S) FOUND IN BOOK]

3

heading S Ely S. 142  
 S E 1/4 S. 145  
 S E 3/4 E. 146  
 S E 156

Water broke over Bow 3.02 +

S E 1/2 E. 2.09

shot down 2.13

going out of channel

2.14 - stopped - lying to

2.29 - full speed SE 1/2 E 130

ships heading 2.45 SE 1/2 E

2.42 SW 1/4 S.

whistling buoy and light

shp. between 2.48

lost land light ship 2.55

changing course 2.57

E. N. E. 2.30

stop record at 3.5 to  
 repair

start at 3.10

heading North 3.15

S E 1/4 S 1/2 S. 3.28

Off Ambrose Light Ship 3.35

N.W. by W. 3.43

Change course 3.48

Stop engines 3.50

Start 4.12

N.W. by W. 4.15

N.W. by W. 4.18

Change course 4.24

S by W. 4.26

Half Speed 4.32

Full Speed 4.44

N. N.W. 4.47

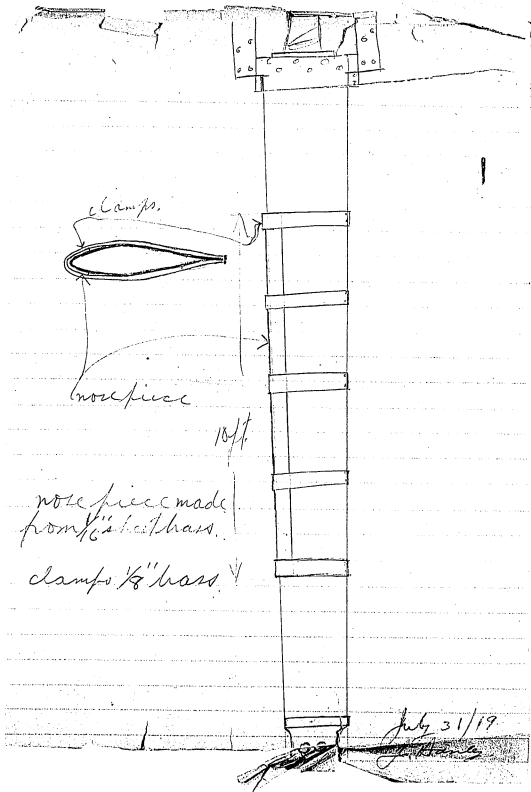
[ITEM(S) FOUND IN BOOK]

Blanche House 5.21  
 Blanche " " 5.33  
 Entering the Narrows 5.50  
 Passing Bluffs of Liberty 6.20  
 Crossing North River 6.29  
 approaching 7.4<sup>th</sup> St.  
 stop engine 6.55  
 very calm  
~~tie up at dock at 7.4<sup>th</sup> St.~~  
~~at dock at 7.4<sup>th</sup> St.~~  
~~at dock at 7.4<sup>th</sup> St.~~  
 at dock at 7.4<sup>th</sup> St.  
 making dock?  
 tie up at dock at 7.4<sup>th</sup> St.  
 back full speed 7.6  
 stop record at 7.10 PM.

[ITEM(S) FOUND IN BOOK]

Dalafamg 23

[ITEM(S) FOUND IN BOOK]



July 31/19  
J. H. H. S.

[ITEM(S) FOUND IN BOOK]

July 31 - 1918

Start 8:15 turning around at 10 o'clock  
Full picnic ahead 8:19  
Change banner 8:27  
Stop 8:35

[ITEM(S) FOUND IN BOOK]

Aug. 8, 1919

pulling anchor  
at 10:48 AM (rising)

Water very calm  
start in slow engine  
slow 10:50

stop 10:51

Listening in port  
and starboard

hear crash of oak  
beam against

at 10:51  
very faint  
and in all the time  
until 2:45 P.M. very faint  
Coastline visible 98

2

half speed

much quieter than  
K. tubular (p. 600)

Water noise just like  
at the end of each

increasing in volume

heat, as we go on  
They come in too rapid

at 10:51

very faint

part is very faint  
starboard beam to the

noise

[ITEM(S) FOUND IN BOOK]

Sept. 10 to K. L. L. L.  
 from 12:12 P.M.

Sept. 1950 from K. L. L. L.  
 from 12:12 P.M. to 12:12 P.M.  
 on the way, lighted the  
 lamp of the car and then  
 the car.

from 4 to 10 P.M.  
 Sept. 10 to 10 P.M.  
 from 12:12 P.M. to 12:12 P.M.

100 PPM. from 12:12 P.M.  
 to 12:12 P.M.

from 12:12 P.M. to 12:12 P.M.

from 12:12 P.M. to 12:12 P.M.  
 from 12:12 P.M. to 12:12 P.M.

[ITEM(S) FOUND IN BOOK]

Stop everything at 11:22

1 20 nothing  
star 1 by

1 23 station the

127

9/23 Hasty 15x

$$\begin{array}{r} 46 \\ 18 \overline{) 848} \\ \underline{72} \phantom{0} \\ 128 \phantom{0} \\ \underline{108} \phantom{0} \\ 208 \phantom{0} \\ \underline{180} \phantom{0} \\ 288 \phantom{0} \\ \underline{270} \phantom{0} \\ 188 \phantom{0} \\ \underline{180} \phantom{0} \\ 88 \phantom{0} \\ \underline{84} \phantom{0} \\ 48 \phantom{0} \\ \underline{46} \phantom{0} \\ 28 \end{array}$$

(Rev. Engineering 90)

Get out to K. tube  
terrible noise at 5X  
can't hear bell

Home-bell Plain of  
Michigan with the following

Left at 1 and 9  
from Hull going out  
to m. l. 20

[illegible]



[ITEM(S) FOUND IN BOOK]

- 6880

at same height of  
2710. Page 271/16

from above level the  
3/4 mile to the top of  
stream

Point 2511  
5 N. of 2511, 2512, 2513

[ITEM(S) FOUND IN BOOK]

Aug. 12, 1919

Went out at 11:35  
 Most in engine  
 820 ship  
 and distinct broods  
 hear ship 84 beats  
 our own ship  
 listening in both sides  
 running 5 knots  
 just leaving  
 engine of Hays  
 pump is closed  
 and for chimneys  
 for noise

2

Went out at 11:35  
 Hear tug  
 count 100 B at 2 knots  
 from other boat  
 hear tug at 34 miles  
 at 34 miles  
 count 92 B  
 hear tug  
 loud steady roar  
 less and less on  
 station don't hear  
 tug on boat

[ITEM(S) FOUND IN BOOK]

3

hear bell on foot  
also notice flying  
hear into a knock  
quickly that thing

hear knock  
hear ship 1000000  
hear stream  
with of water  
rapidly beats  
very loud 8 & 9 PM  
dead stream  
hear, this one plain

15 old down  
18 R.P.M.  
7 1/2

4

17 57  
57 103

slow beats,  
hear bell

still hear old  
dominant line  
bell down on it  
line

two chairs,  
hear with coat  
hear from wing  
10:34 to

hear line on foot  
sings very loud 1000000  
17 R.P.M., 17X3 beats  
12.3 to 12:40 minutes  
on about 7 R. beats 1000

[ITEM(S) FOUND IN BOOK]

hear hammer blow  
 lower another boat  
 at 12:40 Port side  
 6 O.R.P.M. 60x4 feet  
 course 121 1/4  
 to port stern 200 1/2  
 ft

hear ship 11 PM  
 it's a large ship  
 our speed 5 K.

hear ship 7 K.  
 7 K.

6.  
 1's ship  
 start 11:45  
 1 1/2

hear ship ship  
 sail away to bow  
 listening in port and  
 starboard.  
 ship transom port  
 bow. swimming away  
 from us

hear steady loud  
 hoovering sound

[ITEM(S) FOUND IN BOOK]

7

Northern Pacific  
boating full of  
tumble noise  
500 yds away  
picking up Pilot.  
tumble noise High  
steady noise  
(Lump noise)  
stopped.  
few bell plain r/y  
hear another boat  
port bow.

Hear N.P. again  
separately - loud noise  
steady.

8

similar to torpedo  
noise.

about 1500 yds.  
hear her to 2 miles.

our engine 92 RPM.  
S.K.

[ITEM(S) FOUND IN BOOK]

9

our speed  
beam 2:52:30  
tramp light

heard a tramp steam  
2:55 10K 42X4

tramp stopped.

72 R.P.M.

1000 yards 3/4 mile  
to starboard.

Aug. 12. 1919

Start 1,13.0

Ahead Half Speed	11.40
" " Slow "	11.45
Change Course	11.45
Stop mini engine	11.46
Ahead slow speed	11.51
" " Half "	11.52
Change Course	11.57
" " " "	12.00
" " " "	12.06

[ITEM(S) FOUND IN BOOK]

Aug 14, 1917

Getting ready to get

under way

Start recording 1:45 P.M.

raise anchor at

check recorder from 1:5

to 2:20

under way half past 2.12

Large Bunker

2.15

Full Speed

2.17

Large Bunker

2.19

In Narrows

2.25

Large Bunker

2.27

" " " "

2.30

Change Course

2.35

stop recording antenna North  
river 4:45.

[ITEM(S) FOUND IN BOOK]

Sept. 14/19

#

Leave Sandy Hook  
dock at 8 AM.  
count 80 RPM of  
Haul engine.

Hear a tug moving  
load to our starboard  
side, about 300 yds.  
increase speed to  
10 knots.

Count 128 RPM,  
256 beats

count 35 x 4 = 140

Count 160 RPM.

The noise that  
I hear is purely

2

engine noise.

Very calm outside  
to day.

Hear a tramp  
to the port boat,  
1670 yds.

Her RPM is  
mixed with waves  
cannot count.

Tramp - Coasts off Starboard Bow  
going away from us. 2100 yds.  
yds. still hear. cannot hear  
on Port side.



[ITEM(S) FOUND IN BOOK]

104000 3

3.250

Hear Italian Battleship about 9.00  
 Smiled with Cargo Boat. Cargo  
 boat very loud  
 Long Board on to Ambros Lightship  
~~the ship~~ Bell not ringing  
 asked ship to start Bell started 9.43  
 at light ship. Long away from  
 Light ship at 90 knots. 9.45  
 372 yds. 9.48 very loud.  
 66.5 " 9.49 30 A.M.  
 119.0 " 9.51 30 " "  
 152.0 " 9.53 12 taps a minute of Bell  
 19.55 9.54.30 A.M.  
 Hear better on starboard than Port side  
 still going 10 knots. Light ship over  
 on Port bow.  
 4.022 yds 9.59 still very plain

10,000.00

speed increased 10.00  
 3.3.50 10.04 still very plain  
 Distaining on Port and Starboard Piers 10.05  
 Speed decreased 10.08 A.M.  
 700.0 10.09 A.M.  
 1.45 P.P.M. 10.13.30  
 Hear bell plainly  
 On the side of the 10.15  
 10,000 not sure of range cannot see  
 Light ship on account of haze 10.19  
 Lost touch at 145 miles 10.23

Still at same range 10.25  
 picked up hell again  
 very plain.  
 continued search at

[ITEM(S) FOUND IN BOOK]

5

5 knots 90 R.P.M.  
at 10:27

100 RPM

1 beam Bell very plain 10:28

1100 overboard of Bell very plain

8 Turned Boat around

We are now steaming away from light ship at 5 knots beam Bell

Plain 10:28 94 R.P.M.

1045 100 R.P.M.

1048 82 R.P.M.

1055

Lost Bell 10:55

No. 1 on Chart Indicates Position Lost

6

Sailing away from light ship  
to determine distance 11:10

Range of which bearing Light ship 11:22

Can just hear  
bell (Hauls lying  
to) and light running  
position of Hauls  
is dead lead on  
light ship.

Position is shown  
by No. 2 on chart.

We now get position  
ahead of light ship  
Port side ahead  
hear bell about the

[ITEM(S) FOUND IN BOOK]

7

8200 C.

We now turn away  
from light ship and  
lay to.

Can just hear bell  
about the same  
intensity (very weak)

We now run ahead  
of light ship.

Back and forth  
coming closer each  
time, port and star  
alternately.

Speed 5 k. 90 turns  
I count 100 RPM.

8

RPM. back 92

12' 20" hear bell  
faintly but plain  
position 3 or 4  
15 knots per sec.

1100 " start from buoy  
4 miles from light  
ship and sail away  
with steam to bell  
at 10 k.

I count 145 RPM  
Engine room 154  
I count 152 RPM.

[ITEM(S) FOUND IN BOOK]

9.

Range from buoy  
3000 yds.

10 Knot speed  
just hear bell  
fourteen 4 or 40

reverse course  
and back for  
light ship.

11:21:30

Flout 140 RPM

2100 from Buoy 1 26 P.M.

1610 " " 1 27 " "

1435 " " 1 28 " "

11 50 1 29 " "

Bell does not ring any more 1:30

we stop main engine to find out

10

Bell does not ring

Clearing water very good.

2 P.M. running to Light ship at 10 Knots  
2:14 140 RPM

2:17 P.M. off Light ship going down

asked ship captain what time he stopped.

Bell heard 11:55 P.M. 2:21 P.M.

2:20 230 light ship is scheduled to stop

Light ship Relief to continue dragging

Sub Bell until we returned. Bell

started 232 3 and light ship at 10 knots

134 RPM 2:37 P.M.

140 R.P.M. 2:47

140 " " 2:57

140 " " 3:05 off Buoy station

675 yds of Buoy station 3:08 P.M.

[ITEM(S) FOUND IN BOOK]

3:25'30" **22**

2400  
8100  
10536

9 35.4 gals 3.09

2400 " 3.11

158 RPM 3.14

Turned ship around Port side to 313

Shall speed on 10 knots ahead 3.20

2400 gals from Bungy 3.20

17.000 gals from Bungy stopped ship 3.25

Turned heading Right angle to light ship Port

side to 1480 gals from Bungy 3.32

R.P.M. 160 time 3.33 P.M.

Going towards light ship at 10 knots

3:35 P.M.

160 R.P.M. 3.33 P.M.

Light changed at 12.25 P.M.

Hear bell at 160 R.P.M.

stop of engine ~~etc~~

12  
abeam <sup>12</sup> 12.45  
in <sup>12</sup> 12.45

at 4 mile mark  
very plain

Now running in to  
light ship & being cut  
160 R.P.M. to ship  
some ships 3:48

Hear bell load 3:50  
light ship & range 3000

3:55 ~~1~~ way load 160 R.P.M.

against the tide

arrived at L.S. 4:17

4:20 160 R.P.M.

Stand-By for

raising hole

[ITEM(S) FOUND IN BOOK]

13.

Getting a Position to Enter U.S.S.  
Destroyer No. 153. 4.39 P.M. of  
8th. Steer 2 Points. Our Boat making  
110 R.P.M.  
Hear loud steady Roar.  
300 yds. of 8th Side 4.38 P.M.  
Very loud about 1 Point of 8th Row  
409 yds. 4.43 P.M.  
5.23 5.47  
Sound diminishing at 5.50 yds  
5.48 P.M.  
Cannot hear anymore 4.49 P.M.  
9.55 yds. 4.49 P.M.

14

Passenger Boat Pretty Big 2 Steers  
5.500 yds 5.05  
160 R.P.M. 5.06  
3500 yds. Dead ahead 5.07  
2250 yds. heading forward 5.09  
1710 very loud 5.10  
Drowning can over nearest 5.10  
Terrible working taking of 5.11  
Our Boat stopped 5.12  
Name of Boat Northern Pacific  
Hear Pilot Boat moving slow  
N.P. started terrible noise 5.13  
6.90 yds. 5.16  
following N. Pac 10 knots  
6.40 yds 5.17  
10.20 loud can only move 5.18  
12.70 5.19

[ITEM(S) FOUND IN BOOK]

15

1700 gas	5.20
Our P.P.M. 160	5.21
2200	5.21
2700	5.22
Price getting faint still have scratchy now	4.23
2500	42330

[ITEM(S) FOUND IN BOOK]

$$\begin{array}{r} 3445\overset{2}{2} \\ 6080 \overline{) 103352} \quad 17 \text{ miles,} \\ \underline{6080} \phantom{00} \\ 42556 \\ \underline{42560} \phantom{00} \end{array}$$

$$\begin{array}{r} 14815\overset{2}{2} \\ 5280 \overline{) 44445} \quad 8 \\ \underline{42240} \phantom{00} \\ 2205 \phantom{00} \end{array}$$



[ITEM(S) FOUND IN BOOK]

stopped 4.23 to fix engine  
started engine

230 Ambrose channel  
off Kochang

1194

Range course 20 miles East of Ambrose.  
11.25. Heading E  $\frac{1}{2}$  S.  
E  $\frac{3}{4}$  N. 1 short lead.  
1 short lead.

[ITEM(S) FOUND IN BOOK]

1 P.M.

ships heading E.N.E.  $\frac{1}{2}$  E.

12 miles ~~SE~~ of Fair Island.

3 P.M.

ships heading E.N.E.  $\frac{1}{2}$  E.

Shinners light.

(14 hours for hour)

~~start pitch at 4.5 P.M.~~

Heading N.E. ~~SE~~, restart 5.

~~at 7.15 P.M. touch Pt.~~

Off Nanagasset.

[ITEM(S) FOUND IN BOOK]

Departure taken from Entrance to Sidney Channel  
Boat #2 on Star Beam, Course ESE time 8:16  
180 minutes

Boat White Sea passed ahead 9:14 Course ESE  
Auction light close ahead 9:33 " ESE

Changed course coming about back  
to light ship stopped engine. Then  
heading out to sea, against auction  
close ahead course SE 9:49

SEAE 9:59 8KN  
SEXS 10:13

Boat passed ahead 10:28

Stopped 10:26 full left ladder

Boat 1090 yds away 10:37 Course SE XS  
5 knots.

11:00 full speed ahead. Stopped at 11:09 130

11:15 Swinging 180° Half speed. to Co. S N W X N

11:19 finished swinging stopped.

11:24 Half speed course N W X N

11:25 stopped.

11:29 ahead half speed Co. N W X N

11:31 stopped.

11:36 90° to Starboard to Co. N E X E

11:40 finished swinging stopped.

11:45 Swinging 90° Half speed to Co. S E X S

11:48 finished swinging. Stopped

11:52 Ahead half speed Swinging 90° to S W X W

11:56 finished swinging Course S W X W (1/2 speed)

11:58 Swinging 90° to N W X N Half speed 5 KN

12:00 finished swinging ahead half speed.

Continued 90° more to N E X E

12:04 finished swinging

11:35

[ITEM(S) FOUND IN BOOK]

- 12:04 Changing course to NW x N  
90° left Half Speed.  
12:09 Changing course to SW x W 10° left  
half speed.  
12:12 Changing course to NW x N 70° Right  
half speed.  
12:14 Changing course to NE x E 90° Right  
half speed.  
12:25 Changed course to N x V Speed 5-kts  
12:35 Changed course to N x W x W x W " "  
1:08 Mthawk buoy abeam.  
1:10 Changed course to SE x S Full speed  
1:14 890 yds from buoy

- 1:15 - 1100 yds from buoy.  
1:16 - 1310 " " "  
1:17 - 1550 " " "  
1:18 - 3000 " " "  
1:23 - Changing course to NW x N Full speed  
1:27 - 2100 yds from buoy.  
1:28 - 1610 " " "  
1:29 - 1435 " " "  
1:30 - 1150 " " "  
1:31 - Stopped & m an engine.  
1:34 - Steered NW 3/4 W Full speed.  
1:37 - Changed course NW x W 3/4 W Full speed  
1:38 - Changing course to NW x N Full speed.  
1:52 - Changed course to NW 1/4 W

[ITEM(S) FOUND IN BOOK]

- 2.20 Ambrose light ahead  
 2.32 Course SEXS Full speed  
 2.53 Changed course to SEXE  
 3.05 Changed course to ESE  
 3.06 Mohawk buoy ahead  
 3.09 645 yds from buoy  
 3.09 Changed course to SSE Full speed  
 3.10 935 yds from buoy  
 3.11 1095 " " "  
 3.12 1400 " " "  
 3.14 1630 " " "  
 3.15 1820 " " "  
 3.15 Half speed ahead  
 3.16 Changed course to ESE  
  
 3.20 Changed course to NW Full speed  
 3.21 2400 yds from buoy  
 3.26 1700 " " " Stopped  
 3.29 Full speed to NW  
 3.31 Changed co to NESE Full speed 1480 yds  
 3.37 Changed co to NW 1/2 W "  
 4:00 2700 yards from Ambrose light  
 4:01 2525 " " " did ahead  
 4:12 Ambrose light ahead changed course  
 to NWXW 1/2 W full speed  
 4:27 Slow speed ahead  
 4:33 Full speed ahead co W 1/2 N  
 4:37 course changed to right swinging  
 with full R. Hand on  
 4:39 Observed on EXS 3/4 S

[ITEM(S) FOUND IN BOOK]

4:45 Course changed to SE 1/4 E  
 4:46 ~~4:46~~ 153 ahead on same course  
 4:47 Course changed to SE 1/4 E  
 4:49 " " " EXS 1/4 S  
 4:50 Listener 985 yds away head on slow flow  
 changed course to battboard to W at 4:52  
 4:55 changed course batt. to NW 1/4 W  
 4:55 changed cor to NW 1/4 W  
 5:07 changed course to W 1/2 N  
 5:10 changed to port to SW at 5:11  
 USS Northland 1710 yds away  
 5:12 course changed to port <sup>slow</sup> turn  
 slow speed ahead.  
 5:15 steady on SS ahead half speed.  
 5:16 ahead full speed.  
 5:18 USS N.P. 640 yds. star board  
 5:19 course changed to S 1/4 E 840 yds away  
 5:19:30 SS 1020 yds away.  
 5:20 " 1270 " "  
 5:21 " 1700 " "  
 5:22 " 2200 " "  
 5:23:30 " 2700 " "  
 5:25 " 3300 " "  
 5:28 changed course about to NW 1/4 N  
 5:30 " " " NW 1/4 W  
 5:35 " " " NW 1/4 W  
 5:40 " " " NW 1/4 N  
 5:45 " " " NW 1/4 W  
 5:48 " " " NW 1/4 W  
 5:57 entering Gedney channel.  
 Bow #1 ahead heading in.

[ITEM(S) FOUND IN BOOK]

6:02 Buoy #3 passed abeam.  
6:10 Buoy #2 passed abeam.  
6:15 Buoy #2A passed abeam.  
6:20 Buoy #4 passed abeam.  
6:24 Buoy #6 passed abeam.  
6:28 Buoy #6A passed abeam.

[ITEM(S) FOUND IN BOOK]

Fort Wadsworth S X W  $\frac{1}{2}$  W  
 Statue of Liberty NNE  
 Robins Reef Light N  $\frac{3}{4}$  W  
 SHIP HEAD SW X W  $\frac{1}{2}$  W

$$\begin{array}{r}
 3026 \overline{) 144154.9} \\
 \underline{12104} \\
 23110 \\
 \underline{27234} \\
 5280
 \end{array}
 \qquad
 \begin{array}{r}
 6080 \\
 \underline{7.5} \\
 30408 \\
 \underline{42568} \\
 43600.0
 \end{array}
 \qquad
 \begin{array}{r}
 3 \overline{) 6080} \\
 \underline{2026} \\
 4054
 \end{array}$$
  

$$\begin{array}{r}
 5280 \overline{) 334410.0} \\
 \underline{3715} \\
 31760
 \end{array}
 \qquad
 \begin{array}{r}
 6080 \\
 \underline{7.5} \\
 30408 \\
 \underline{42568} \\
 43600.0
 \end{array}
 \qquad
 \begin{array}{r}
 7.00 \\
 \underline{7.5} \\
 6.5 \\
 \underline{214.9} \\
 7.4
 \end{array}$$





[ITEM(S) FOUND IN BOOK]

1

B-Word Boat Under Tree 11/1/40

30 tank Vesta

Hotel Daniel Vesch. About 8/12/36

800 yds at 1240

Water level of Water 2 ft

off Port bow 12.4 - Samland. Belge  
none

Big Black Pass and Barge

Ship Pich. 1 ft out of water 245

Murder - U.S.S.B.  
NAME

Std. Oil Trug with one Barge in tow  
about 300 yards away 3.25

Barge Boat  $\frac{3}{4}$  of mile away 3.50

[ITEM(S) FOUND IN BOOK]



KNIGHTS OF COLUMBUS  
WAR ACTIVITIES



CAMP \_\_\_\_\_

131

*Shut down.*

- |                 |              |
|-----------------|--------------|
| 1 Main Engine   | at 1:30 p.m. |
| 2 Generator     | at 1:22 p.m. |
| 3 Air Pump      | at 1:24 p.m. |
| 4 Circulator    | at 1:24 p.m. |
| 5 Blower Engine | at 1:24 p.m. |
| 6 Fuel Pump     | at 1:24 p.m. |

*Started up.*

- |                           |                 |
|---------------------------|-----------------|
| Main Exhaust to Condenser | at 1:25 p.m.    |
| Circulator                | at 1:25 p.m.    |
| Feed Pump                 | at 1:25 p.m.    |
| Air Pump                  | at 1:25:30 p.m. |
| Generator                 | at 1:26:30 p.m. |
| Blower Engine             | at 1:26 p.m.    |
| Main Engine               | at 1:30 p.m.    |

*Full Speed 180 R.P.M. = 10 knots*

*Half Speed 90 R.P.M. = 5 knots*

*125 R.P.M. = 7 " "*

[ITEM(S) FOUND IN BOOK]

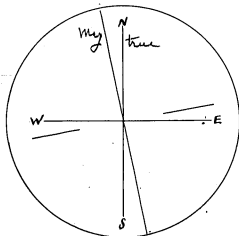
Rockaway

40° 28'  
40° 25'

Ambrose channel  
Bedney channel

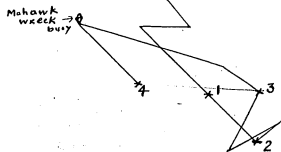
Sandy Hook  
Highlands

[ITEM(S) FOUND IN BOOK]



Ambrase Lightship

Mahawk  
wreck  
buoy



**Notebook Series -- Notebooks by Experimenters Other Than Edison  
Navy and Wartime Research Experiments  
Submarine Detection Books**

These four notebooks were used by E. Rowland Dawson, William Deans, William A. Hayes, and Sherwood T. (Sam) Moore during 1917-1918 for experimental work done for the U.S. Navy. The experiments are related to those in the A. M. Kennedy Books. Include are notes on transmitters, receivers, and audions. Some entries pertain to work done at sea on submarine detection. There are also experiments with sound detection and recording. Some books contain notations regarding Edison's comments, suggestions, and instructions. There are also a few rough drawings by Edison.

N-Number

Labels and Inscriptions on Front Cover

**Selected Books**

17-04-21

"Dawson"

18-03-29

---

**Books Not Selected**

18-06-15

---

18-10-03

---

**Notebook Series -- Notebooks by Experimenters Other Than Edison  
Navy and Wartime Research Experiments  
Submarine Detection Books  
Notebook N-17-04-21**

This notebook was used by E. Rowland Dawson during April-May 1917 for notes on experimental work done for the U.S. Navy. The experiments are related to those in the A. M. Kennedy Books, and some are continuations of experiments in Books #3 and #4 (N-17-04-05 and N-17-04-01), performed by Dawson while Kennedy was in Alabama. Included are notes on transmitters, receivers, and audions. Also included are experiments on funnels for direction finding. The notes indicate that Dawson reported to Edison through William H. Meadowcroft. The front cover is marked "Dawson." The pages are unnumbered. Approximately 40 pages have been used.

73498

*Home Co.,*

MFG. STATIONERS,  
96 JOHN ST.  
AND  
19 PLATT ST.,  
NEW YORK.

*ER Dawson*



Trans # 1 = Small B $\sharp$  Bell  
" # 2 = Large Eb "  
" # 3 = Break wheel & cello + tele.  
" # 4 = Dinner Bell

Receiver # 1 = Straight Bell Tele-  
" # 2 = Bell tel with tube  
" # 3 = Bell tel in brass  
case, attachable horn

Report to Mr Edison through  
Mr Meadowcroft  
Expense account to R W KELLOW  
Charge acct 5005

To Charge batteries

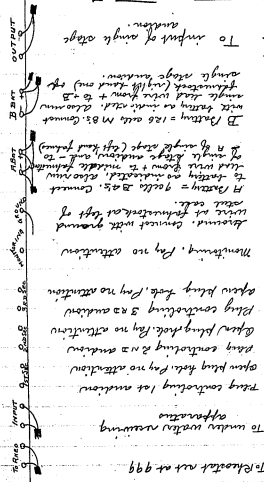
BA = 16 amps 7 hours

BR = 8 " 7 "

MO = 1 " 7 "

1.75 to 1.8 volts required per cell

# CONNECTIONS TO SET UP 3 STAGE + 1 STAGE AUDIONS



To output of single stage audion

To output of single stage audion

To output of single stage audion

To output of single stage audion

To output of single stage audion

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To output of single stage audion

To output of single stage audion

OUTPUT of single stage audion goes to "SET" on one receiving.  
 Resistance box. 90% of this box connecting to SET on other  
 box, REC on two that connecting to receiver.  
 Inductor lead covered wire.

April 21/17

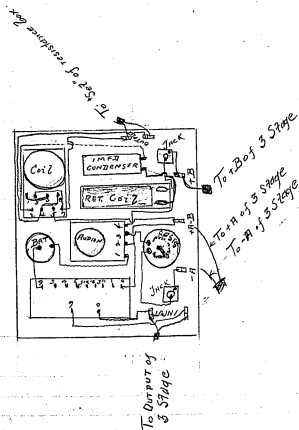
Kennedy left yesterday for Alabama. Telephoned Mr Meadowcroft's office to that effect and said I would continue work here unless I received orders to the contrary. Also wrote him and Mr Edison to that effect last night.

This morning, no orders having been received, we started out. Fog heavy but presumed it would lift shortly which it did.

Meanwhile however, we had run on bar near Island Beach, Tide running out and to remain all day waiting for it to come up and float us off.

Got off at 4<sup>30</sup> but wind had come up and conditions were not good for making tests.

# Sketch of 1 Stage Audion with Connections



SPST Trumbull switch left of 3 stage controls L+N resistance on outside of box. When switch is closed resistance is shunted across input. Close it when reading "Low" on left hand SPDT Trumbull switch.

Two other Trumbull switches control the "10 lavite resistances mounted on base". On low these resistances are in the circuit, on "High" these resistances are shorted out. As the switch to right is kept on high all the time, this switch and corresponding resistances could possibly be eliminated.

Apr 22/17

Frank didn't show up. Went out with Andy alone.

Direction Test

Horn pointed direct at bell and at 90°

Receiver # 3 with funnel

Trans. # 4 (dinner bell)

Weather fine - Very little wind  
100 yards

Pointed straight { Low 46  
High 60

90° Couldn't hear  
Wind had come up a trifle  
Pointed straight (and reading) Couldn't hear

50 yards  
Pointed straight - Can just hear  
on high at 0 intermittently

Tried Trans # 2 Could hear but weak

Thought it looked like bat. trouble  
Tested with voltmeter. Appeared ok.

Found ends of wire running to  
under water phone, oxidized. Scraped  
them. Improvement slight.

Examined all connections and  
looked for water behind diaphragm  
in phone. all ok.

Next tried new A battery in spite  
of voltmeter. Bell rung over side  
which I could hardly hear before,  
nearly broke my eardrums



Test to find value of funnel  
as direction finder.

Ring bell from ship and  
swing boom on launch so  
that funnel points directly at  
bell,  $90^\circ$  from bell and directly  
away from bell ( $180^\circ$ )

Transmitter #4 (dinner bell)

Receiver #3 with funnel

Weather conditions ideal

50 yards:

Straight	{	High 60
		Low 60
$90^\circ$	{	High 42
		Low 20
$180^\circ$	{	High 34
		Low 18

---

100 yards

Straight	{	High 44
		Low 32
$90^\circ$	{	High 14
		Low 8
$180^\circ$	{	High 24
		Low 12

Apparant discrepancy between  
90° and 180° Made 90°  
second time and got

90 { High 36  
Low 16

---

125 yards  
Straight { High 30  
Low 26

90° { High 28  
Low 22

180° { \* High ?  
Low faintly at 2

\* Noise has increased slightly

40 yards  
Straight { High 60  
Low 56

90° { High 46  
Low 34

180° { High 44  
Low 28

Test = Horn Off + Horn On

Trans #4; Receiver #3  
Weather Conditions ideal

### HORN OFF

75 yards      Can't Hear  
50 "                "                "

But get trans. #2 OK.

40 yards      Low 6 faintly  
                         High ?

On a second reading at 40 yds  
could only get at zero on Low.  
So 40 yards is apparently the  
limit with horn off.

### HORN ON

40 yards

High 52

Low 40

75 yards

High 38

Low 34

175 yards  
High ?  
Low 6?

Noise greater now than in  
last experiment

3:15 PM

Direction test to verify

previous  
Trans #4 Receiver #3 with  
horn

Weather Wind blowing in  
Hard puffs. Looks like  
squal coming  
Receiver Noisy

75 yards  
High 28  
Low Can't hear

Hear Bell #2 at 50

50 yards  
 Straight { High 46  
               Low 32  
 90° { High 22  
        Low 16  
 180° { High 6  
        Low ?

Noisy during all above readings  
 When puff of wind would come  
 bell bells lost entirely.

75 yards  
 Straight { High 60  
               Low 46  
 90° { High 30  
        Low 18 faint

180° { High 30  
 Sudden lull - Very quiet { Low 8\*

\* Heard also a boat which I  
 didn't see. On investigation  
 saw tug about a mile across  
 the bay.

Tried taking horn off  
again but didn't seem to  
make so much difference.

75 yards

Horn On

High	60
Low	60

Horn Off

High	60
Low	58

Began to rain and sky looks  
gloomy. Stopped at 30

Apr 24

Only one man on boat. Rain and NW wind. Worked on boat at pier in morning.

Connect lead wire to rubber in anticipation of using tripod wrapping connections with gutta percha, covering thickly with Chatterton compound and making all fast with Chatterton to tape covering end of phone, and wrapping outside with tape.

With cable on, audious very noisy incessant roar. Replaced cable and #3 with #2 and rubber covered wire. Everything OK. Decided to replace cable on #3 with rubber covered.

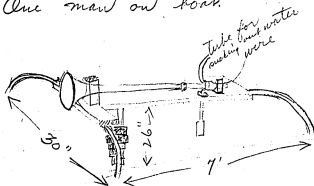
In removing Chatterton, pulled loose Chatterton + tape holding all connections and broke short rubber covered wire off short.

Couldn't fix myself so caught  
6 o'clock train for Orange  
and got Taylor to fix. He  
made two small cushions and  
fitted them over ends sticking  
up, then soldered long wire  
into cushion. Covered with  
gutta percha, Chatterton and tape



April 25

One man on boat



Wood T with pipe legs. Rope fastened around both tripod and funnel leading to boat - 100 feet away.

Launched apparatus with boom as usual before using the above to see if things were working in good shape.

Then sank funnel and tripod. Things much quieter. Noise sounds deadened - more steady and solid.

Noise not annoying as it was before.

Resistance boxes (1 to 60 stuff) seemed to make less difference. Hear tug clearer than ever before.

Sea rougher boat rocking - practically no difference

Gent shiff out, listening to it as far as I could hear on zero. Then signaled Andy to ring bell #2. Heard it easily at 60. So the bell is a bit easier to pick up than shiff.

Number of big gun shots at Proving grounds makes little impression under the water.

Paddle wheel steamers appears to make noise - not a distinctive sound like tug, and very little of that.

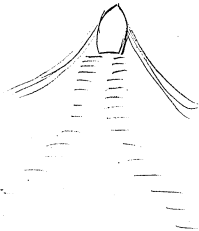
Patten and Albertina passed and could distinguish nothing but possibly an increase of noise when at the points where tugs had been loudest.

When Patten passes, it took 5 minutes for swell to reach us and it's was about 1500 yards from channel, Patten meanwhile had gotten a mile forward.

After 1st swell which made boat rock violently, there was hell then 5 separate sets of swells of 4 or 5 each. After this water was rougher than it was before boat had passed.

Andy says first swell was bow swell and the others stern swells. There are two distinct swells as-

according to him. One from  
bow which goes off side-  
ways and swells which fol-  
low the boat and travel in  
same direction.



He says he has known  
area where we were, to be  
disturbed an hour after  
steamers had passed. Im-  
agine flats which are all  
ground there, have lot  
to do with it.

Tide also — They are  
greater in low tide

Apr 26

Hard rain all day. East  
wind. Did not go out.  
Only one man at post

Apr 27

Sun is out but N.W. wind is strong  
Will try it in the bay but am afraid  
will be too rough there. Secured  
man on boat  
female on boat

Stopped at first buoy in  
river as weather was very  
threatening.  
Test. To find value of  
extra heavy diaphragms.

Receiver # 2 Trans # 4  
300 yards  
Weather fair.

Something seems wrong with  
resistance boxes. Conducted these  
tests with boxes out relying  
on ear.

Reg. bell diaphragm  
Hear only at intervals.  
Knocks and frying in Rec.

A = .060 Slow. Heard noise  
like exhaust of gas boat.  
It slowed down and died  
away just as boat does  
when stopping. No boat  
in sight. After this pretty  
quiet and Reg. bell very  
distinctly

B = .040 Not as quiet as A  
about boat stopped but hear  
bell clearly

C = .032 Very little difference

D = .020 Hear bell but not  
as clearly. Noise very much  
greater.

Reg Bell (Repeat) Can't hear  
bell - Noise much louder



Took resistance boxes' levers off and cleaned them. Boxes now work OK and audions are much more noisy on low numbers but noise is out entirely at 40

---

Test to find if we hear propeller on engine of skiff. With funnel in air and skiff running up and down 40 yards away, get explosions of exhaust and noise. Not a musical sound. No rhythm except puff puff.

With funnel etc submerged get rhythmical whurring sound that sounds like a propeller and think it is

1000 yds  
Trans 2 Rec #3  
with diaphragm A

Hear at 3L High  
Can't hear on Low  
Frying at times

500 yds  
Low 1L  
High 44

Omit

Omit.  
Neglected to suck water into funnel

## Distance Test

Trans # 2

Receiver # 3 Diaphragm A-060

Weather - East wind - Long rolling  
swell which rocked boat considerably.  
Funnel etc sunk on tripod  
Anchored half way between bell  
boom and Allan High Pier.  
Audience very quiet and  
steady. Undoubtedly would have  
been big fun if launched by boom  
with reg bell diaphragm.

400 yds

Saw	30
High	46

700 yds

Saw	32
High	52

1200 yds

Saw	30
High	44

1800 yds

Saw	26
High	32

2200 yds  
High 38  
Sow 20

2800 yds  
Sow 18  
High 38

3000 yds  
Sow 14  
High 38

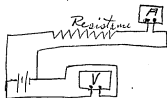
3400 yds  
Can't hear

Unable to account for discrepancies between 400 + 700 and 1800 + 2200

Caught propeller about 2000 yds as ship was coming in

Practically no noise at all during about readings and launch was rocking considerably

To Test Batteries for  
Being Discharged



For B<sub>2</sub> resistance should  
be such for 10 cells average  
should be about 8. Voltage 12

For B<sub>4</sub>'s 16 Amps + 12 Volts

May 2/17

Kennedy in Orange.  
Station - near old pier Sandy Hook

Test - To Find Value of Funnel  
as Direction Finder

Trans # 4

Rec. # 3 with funnel and tripod  
launched from boom.

Weather Good.

	60 yards	
Straight	{ High	60
	{ Low	60
90°	{ High	60
	{ Low	48

	85 yards	
Straight	{ High	60
	{ Low	50
90°	{ High	56
	{ Low	48

Trans # 2

200 yards

Straight	High	60
	Sow	42
90°	High	55
	Sow	42

600 yards

Straight	High	52
	Sow	40
80°	High	50
	Sow	38

800 yards

Straight	High	38
	Sow	20
70°	High	40
	Sow	20

1000 yards

Straight	High	38
	Sow	16
90°	High	34
	Sow	12

1500 yards  
Straight High 28  
Saw 12  
90° High 38  
Saw 14

2000  
Straight High 28  
Saw 6  
90 High  
Saw Can't Hear



May 12/17

Test to Find Value of Mica  
Diaphragms with Soft iron  
Centres 1" in diameter

Tran # 4

Receiver # 2

Weather Good

Distance 75 yards

Regular Bell Diaphragm

Low 36

High 52

.009 Mica Centre .004

Disc towards Magnet

Low 34

High 46

Disc away from Magnet

High 54

Low 38

.005 Mica Centre .004  
Disc Towards Magnets  
Low 38  
High 58

---

.004 Mica Centre .004  
Disc away from Magnets  
High 48  
Low 34

Disc Towards Magnets  
Low 28  
High 46

---

Built Up .010 Mica. Two layers  
.010 Mica and one of .013 Iron  
Low 16 } Noisy  
High 28 }

---

.004 Mica .013 Centre  
Continuous Roar Can't Hear

.011 Mica .004 Centre  
Disc away from Magnets  
Can't Hear

---

Built Up .004 Mica, two  
Layers .004 Mica one of .004  
Iron

High	54
Low	36

---

A M Kennedy  
101 Cloverdale Road  
Montgomery Ala

## NOTES

Tug seems louder running  
broadside to us than running  
stem on.

In breaking in operator will  
be necessary to let each  
one listen to the sound actually  
made by a submarine so they  
can recognize the sound.

Batteries ought to be connected with  
switch so they can be cut off  
when not in use.

**Notebook Series -- Notebooks by Experimenters Other Than Edison**  
**Navy and Wartime Research Experiments**  
**Submarine Detection Books**  
**Notebook N-18-03-29**

This notebook was used by William Deans, William A. Hayes, and Sherwood T. (Sam) Moore during March-April 1918 for experimental work done at sea on submarine detection. Included are notes on experiments with sound detection and recording. Several entries contain notations regarding Edison's comments, suggestions, and instructions. There are also some rough drawings by Edison. The book contains 27 numbered pages, some of which are blank.

Wm. Dean  
Key Mast.

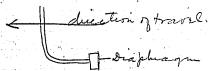
75428  
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MFG. STATIONERS,  
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AND  
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NEW YORK.

March 29<sup>th</sup>

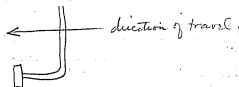
"Trench" over side of launch

Apparatus 8" inside dia. brass pipe  
rubber diaphragm.

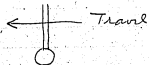
1 Diaphragm pointing backward.



2



3





For quietness with boat in motion #2 is undoubtedly the best. #1 and #3 are about the same - Very Loud

#2 is comparatively quiet but still there is enough noise so that the detection of any noise is impossible.

With boat still but engine running any position gives the same results. Can hear noise of own engines loud enough so that outside noises could not be heard.

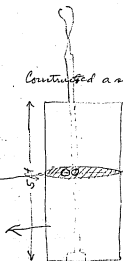
Standing still with engine shut down there are no outside noises except a water gurgle and conditions are about the same as working from dock with perhaps less local noises.

A depth of about 4 feet seems to be the best. For depths of 4 feet and above the conditions are about the same. A depth of 1 ft or 4 ft 6 in. is then about the best depth at which to work.

Speed of boat in water while in motion about 7 knots per hour

April 3, 1918

Constructed a stream line device as shown.



Tried out over side of launch.  
At 3 knots/hr. there is hardly any noise. At 5 knots/hr. noise was reduced about 90% compared with noise using bare pipe. At 7 knots noise increased a little and at 10 knots the noise is very much less than the noise with the bare pipe running 5 knots. Not still there is too much noise to detect the slight noise made by a boat.

The noise of the engine in our own boat could be heard up to 5 knots.

This device does not create much disturbance in the water. Two men held it with less effort than holding the bare pipe at 5 knots.



The water banked up in front of the device for a distance of about 9 inches (as shown to the left above) when travelling 10 knots/hr. It did not create a great disturbance in the water. At the stern there was

a small wave set up, about 18" astern, where the water seemed to come together from each side. There was, however, no pocket at the side except at the stern where the water was about 2 inches lower than the water level.

April 4th.

Tried stream line apparatus as above with boat moving and tried to listen for standard Bell. I found that the bell could not be heard while the engine of the boat was running whether whether the boat were moving or not.

Tried a still test - apparatus stationary. Heard standard Bell distance of 250 feet.

April 4th.

Apparatus #1



One diaphragm.

Apparatus #2



Two diaphragms.

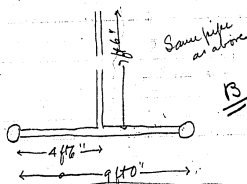
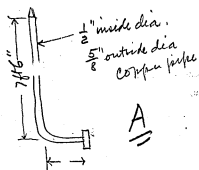


Apparatus No. 1 Bell heard by Hayses 610' by Drane 690'  
 " " 2 " " " " 660' " " 650'

No difference for distance.  
 distance 650 feet.

High tide, still water.

10



Supporting disks for rubber  $.16 - \frac{1}{4}$ " holes



11

I

April 5th.

Tried pipe as in A (opposite page) (one rubber diaphragm).

Distance 640 feet.

For pipe as in B — two rubber diaphragms.  
Distance 675 feet

With this pipe the position of the diaphragms with respect to the source of sound makes no difference in the intensity of the sound heard.

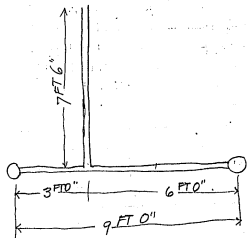
It With mica diaphragm 0.005 in thick between pipe and hearing tubes.

With single Diaphragm separates  
Distance 550 ft.

With Two Diaphragms - separates  
Distance 550 ft.

Standard Bell used.

High tide - still water.



Diaphragms and holes same as in previous  
apparatus —  $16\frac{1}{4}$ " holes

April 6<sup>th</sup>

With apparatus as shown on opposite page  
the Standard Bell can be heard 650 ft.

There was no difference in the intensity of the  
sound heard for revolution through a complete  
circle about a vertical axis than the upright position.

14

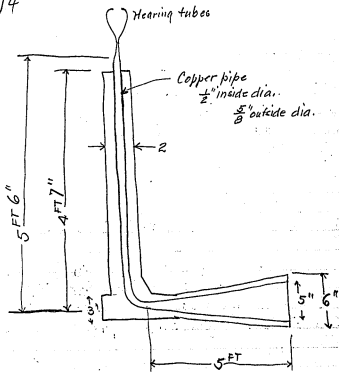


Plate in mid (wide mouth) of horn  $\frac{3}{16}$ " thick  
contains 277  $\frac{1}{16}$ " holes dia. of enveloping  
wire =  $5\frac{5}{16}$ "

Ratio Sum of area of small holes to area of one  
of dia  $5\frac{5}{16}$ " = 61%

$$\frac{277 \times (\frac{1}{16})^2}{(5\frac{5}{16})^2} = \frac{277 \times (\frac{16}{256})}{16 \times 5.3125} = \frac{277 \times 16}{7225} = 61\%$$

sq in dia.  $16 \times 5.3125 = 84.15"$

15

April 8<sup>th</sup>

With apparatus as shown on opposite page.  
Standard Bell can be heard 400 feet.

Same results with thin rubber, tightly and  
loosely stretched and with heavy rubber, tightly  
stretched.

Mr. E. says - try same apparatus with  
cylindrical device extending 30" from end of funnel.  
Hays & Evans.

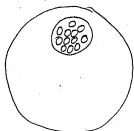
April 12<sup>th</sup>

Tried out above apparatus fitted with hood 30" long.  
Hear Standard Bell 750 feet. Removing hood reduces  
distance bell can be heard to 550 feet. Actual ring  
of bell can be heard.

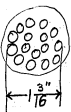
Fitted apparatus A of page 10, with mica  
diaphragm .015" thick. Distance 750 feet. Actual  
ring of bell can be heard very clearly.

Water very calm - high tide still water.  
Hays & Evans.

It found that when horn with hood on is pointing at bell  
the sound is louder than for any other position. When  
the horn points directly at the bell, the sound heard is more  
distinct than for any other position.



Each disk as follows.



16 -  $\frac{1}{4}$ " holes.

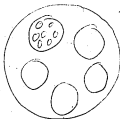
Ratio aggregate area of small holes to area one  $1 \frac{3}{16}$ " dia = 71%.

Apr. 10<sup>th</sup>

Experiment given by Mr. E.

Have diaphragms made up in mouth of horn.

Each small one to be like other small ones.



April 13<sup>th</sup>.

Tried this device with nine diaphragms but at 500 feet distance, the diaphragms leaked and with water in the device, the test had to be discontinued. Hood used on horn.  
Area  $1 \frac{1}{2}$  / 1000.

April 14<sup>th</sup>

Tried the above device fitted with rubber diaphragms. Could hear bell 865 feet.

Then tried the single diaphragm, small pipe, apparently, as shown at A page 10, for comparison. With this device the bell could be heard the same distance viz 865 feet.

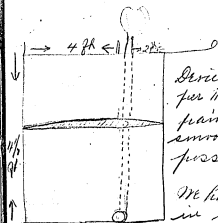
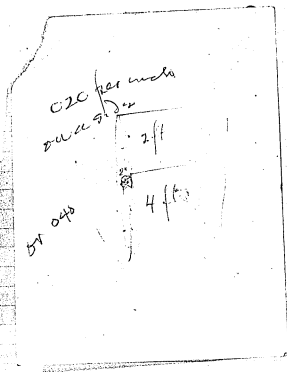
Hood used on large horn apparently.

Water - calm - high tide. Water was very clear - could see bottom through 28 feet of water.

Outside noise very slight. ~~NOTE~~







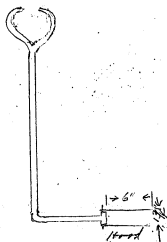
Device made of wood as per Mr. E. Skelton on off page painted to get as smooth a surface as possible.

We had no difficulty in towing this

apparatus and could hear the bell at 600 feet, with launch running about 6 knots.

The diameter of above was 2" at widest point.

Hardly any water noise but could hear engine of launch plainly but did not prevent hearing of bell.



Pipe measured  $\frac{1}{2}$ " inside  
 " "  $\frac{9}{16}$ " outside and  
 metal copper

April 18, 1918 23

Made trial with device as per  
 sketch on opposite page and  
 while the water was very rough  
 was able to hear bell 800 feet

Then took wood off and best I could  
 get was distance 675 feet

When wood is on water noises are  
 reduced at least 50%

Made Trial with device same as  
 above only reduced to  $\frac{2}{3}$  the size  
 and  $\frac{1}{8}$ " holes instead of  $\frac{3}{16}$ " and  
 could hear bell 450 ft with wood  
 and 275 without wood.

A mud auger was used  
 $\frac{1}{2}$  of 100" thick

April 19 1918 25

Made up diaphragm following  
 PM 6. instructions same as  
 used in standard. 16-1/2 holes  
 and 1/1000 mica then put  
 test on mica coming a hole  
 with brass rod 1/8" diameter and  
 found same would stand  
 weight of 6 lbs 9 oz. before  
 distorting mica

April 20 1912 27

Made tests of 3 different lengths  
of hood 6" - 12" - 18" and  
found that 6" was best  
getting 850 ft. 12" was next  
best getting 800 and 18" the  
last was 1450 feet.  
The longer the hood the weaker  
the bell.

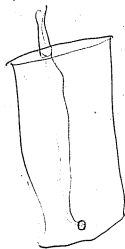
Made jacking attachment to  
place over diaphragm



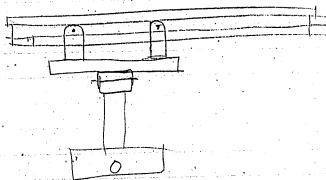
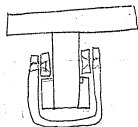
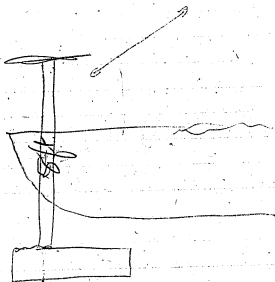
and found it weakened diaphragm  
very much getting bell at 175 ft.  
Then put 6" hood on and could  
get 210 ft. only

Try again as Mr. E says there must  
be something wrong

SSO - loose ball - still / work

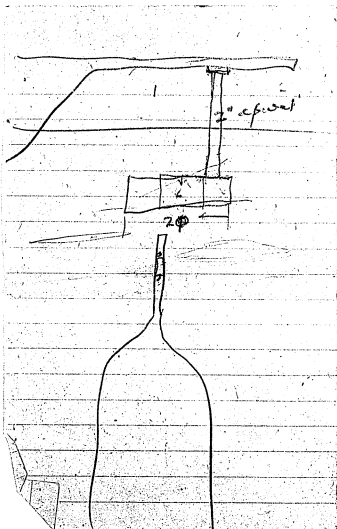
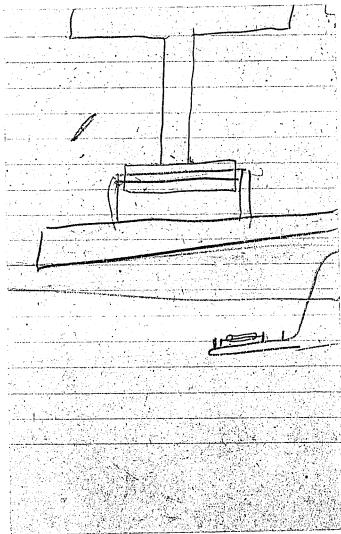


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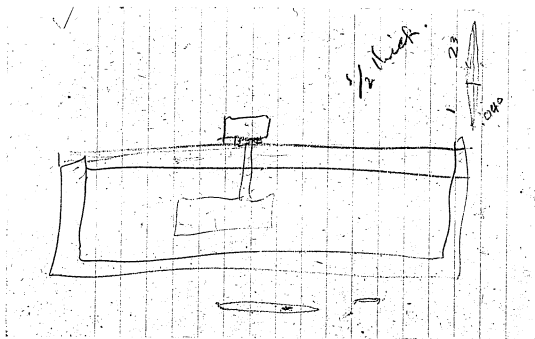




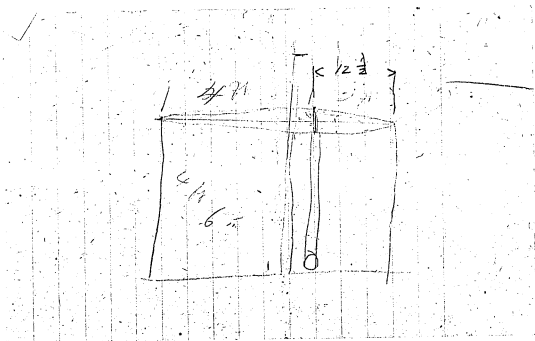
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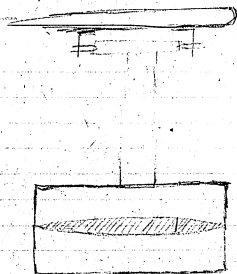
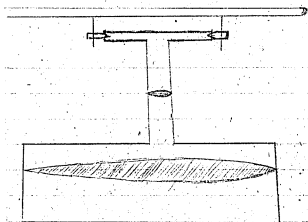
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This edition was made possible by grant funds provided from the New Jersey Historical Commission, National Historical Publications and Records Commission, and The National Endowment for the Humanities. Major underwriting has been provided by the Barkley Fund, through the National Trust for the Humanities, and by The Charles Edison Foundation.

We are grateful for the generous support of the IEEE Foundation, the Hyde & Watson Foundation, the Martinson Family Foundation, and the GE Foundation. We acknowledge gifts from many other individuals, as well as an anonymous donor; the Association of Edison Illuminating Companies; and the Edison Electric Institute. For the assistance of all these organizations and individuals, as well as for the indispensable aid of archivists, librarians, scholars, and collectors, the editors are most grateful.

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ISBN 978-0-88692-887-2

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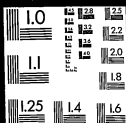


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